

'The "Perfyt Scyens" of the Map; a Study of the Meaning and Interpretation of Local Maps in Early Tudor England 1509-1547'

Lewis John Kaye Roberts
Queen Mary, University of London

70,056 words (excluding bibliography)

This work was supported by the AHRC (BGP award reference: 0673)

A thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy, University of London

Statement of Originality.

I, Lewis Roberts, confirm that the research included within this thesis is my own work or that where it has been carried out in collaboration with, or supported by others, that this is duly acknowledged below and my contribution indicated. Previously published material is also acknowledged below.

I attest that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge break any UK law, infringe any third party's copyright or other Intellectual Property Right, or contain any confidential material.

I accept that the College has the right to use plagiarism detection software to check the electronic version of the thesis.

I confirm that this thesis has not been previously submitted for the award of a degree by this or any other university.

The copyright of this thesis rests with the author and no quotation from it or information derived from it may be published without the prior written consent of the author.

Signature:

A handwritten signature in black ink that reads "Lewis Roberts". The signature is written in a cursive style with a large, stylized 'L' and 'R'.

Date: 16th January 2014

Abstract.

This thesis begins by examining an unexplored contextual background for sixteenth century local maps. It argues that the architectural drawing techniques developed by master masons in the late twelfth century continued to be taught to the King's masons well into the sixteenth, and that these drawing techniques lie behind the innovations in sixteenth century topographical mapping.

Having provided a history of the craft skills that were adapted to make sixteenth century local maps this thesis moves on to consider why masons adapted craft skills traditionally used in full scale drawings on stone and plaster surfaces to make small, paper maps in the sixteenth century. It examines the way in which sixteenth century local maps were used and argues that the changing demands of patrons put pressure on master masons to alter the way in which local maps portrayed their subjects.

The surviving archival evidence suggests that Henry VIII was the principle patron of local maps and my research examines the influence of the king over the shifting form of the map. It uses the letters and drawings sent between Henry VIII and his craftsmen to examine the decisive changes that Henry VIII made to the nature of the relationship between patron and builder, and the consequent effects of these changes over the forms of the image used to communicate between them. My argument suggests that Henry employs and promotes the craftsmen whose drawings allow him the greatest level of design control over the works he finances and that through this system maps and plans rapidly advance to include the technical drawing techniques which had, during the Middle Ages, been used exclusively among masons as on-site, working drawings.

This thesis focuses attention on the technical aspects of map making, examining the material skills used to construct Henrician local maps and arguing that sixteenth century local maps need to be related back to the craft skills of an older tradition of masonic drawing. It also suggests that map historians need to look more closely at the correspondence sent between the king and his craftsmen and it argues this archival evidence provides a new contextual background with which to understand the changing forms of the Henrician local map.

Contents

Statement of Originality.	2
Abstract.	3
List of illustrations.	6
Introduction	8
<i>i. Definitions.</i>	8
<i>ii. Critical review and Methodological Approach.</i>	14
<i>iii. Chapter Summary</i>	20
Chapter One. The Influence of Medieval Architectural Drawing over the Plats of the Sixteenth Century.	26
<i>i. A Study of the Techniques used to Construct the Scale Drawings of 1541.</i>	27
<i>ii. The History of Architectural Drawing in the Middle Ages.</i>	36
<i>iii. Finding the Origins of Sixteenth Century Mapping Techniques in Medieval Architectural Drawing.</i>	48
<i>iv. Why was Scale Drawing Not Used in the Middle Ages?</i>	71
Chapter Two. Drawings for patrons 1450-1529	76
<i>i. How Might Masons Have Learnt to Draw Pictorially?</i>	77
<i>ii. The Use of Written contracts and Pictorial Drawings in the Work Made for Patrons before 1530.</i>	81
Chapter Three. Henry's patronage 1509-1539.	97
<i>i. The Documentary Evidence of Henry's Architectural Involvement During the 1530s</i>	103
<i>ii. The Drawings Made for Henry between 1529 and 1539.</i>	106
<i>iii. Why Might Master Masons Have Chosen to Draw in the Technical Mode in the 1530s?</i>	115
<i>iv. Conclusion</i>	117
Chapter Four. Henry's patronage 1539-1546	121
<i>i. The King's Works on The Manor House and Fortifications at Hull.</i>	127
<i>ii. The Works at Boulogne.</i>	131
<i>iii. The Works at Ambleteuse.</i>	138
<i>iv. The Negotiations around the Treaty of Camp.</i>	142
<i>v. Conclusion.</i>	148
Conclusion.	150
Illustrations	158

List of illustrations.

1. Plat of the walls of Guines as they stood in 1539.
2. Plat of the proposed works for Guines, made in 1540/1 but never completed.
3. Da Vinci's drawing of the Walls around Cesara.
4. Copy of figure two with the gold scale boundary emphasised in black.
5. Copy of Figure one, showing the points at which Rogers could have measured.
6. Copy of Figure one, showing the three points plotted as a starting guide.
7. Copy of Figure one, showing multiple points plotted within the scale boundary.
8. A photograph of modern templates.
9. A painting of a master mason with sixteenth century templates in the background.
10. John Bilson's drawing of the slab of tracing floor from Byland Abbey.
11. Drawing showing placement of central roundel within a reconstructed image of the rose window at Byland Abbey.
12. Image of the the drawing of the central roundel on the wall below the rose window.
13. Photograph of the drawing of the central roundel incised into the wall (emphasised in chalk).
14. Photograph of a surviving piece of the roundel which matches one sixth of the drawing photographed in figure 13.
15. Plat of the waterways around Hull (emphasising the area magnified in fig 16 and 17).
16. My own reproduction of the curves of the waterways around Cottingham.
17. My own reproduction of the springs in the plat of the Hull waterways.
18. Photogrammetric reproduction of the York tracing floor.
19. Photogrammetric reproduction of a window at St Mary's Church in Ashwell, Hertfordshire.
20. Photograph of the lines incised into the tracing floor at Wells.
21. Photogrammetric reproduction of a drawing of window tracery on the tracing floor at Wells.
22. Copy of figure 21 with a reproduction of an actual window at Wells superimposed over the image on the tracing floor.
23. Complete drawing of a window at Wells superimposed over a simplified version of the tracing floor drawing.
24. Reproduction of the lines on the tracing floor overlaid with a combined image of roof vault and window tracery.
25. Simplified plan view of the roof vault.
26. Photograph of the fragment of a drawing of Window tracery found at St John's Cambridge.
27. Photogrammetric reproduction of the group of drawings on a wall at Ely Cathedral.
28. Detail of one of the drawings portrayed in fig. 27. A small sketch of window tracery.
29. Photograph of a drawing of a template in the Peyps sketchbook.
30. Reproduction of drawing of window tracery incised with a dry point scorer into the Peyps sketchbook.
31. Projection of how fig. 30 would look if complete.
32. Photograph of the doorway at St Stephens Church, Bristol.
33. Modern diagram showing the profile of the doorway photographed in fig. 32.
34. Photograph of the drawing of the door at St Stephens made in William Worcestre's notebook.

35. Photograph showing the placement of Roger's carvings within the great hall.
36. Photograph of the restored becketts.
37. Photograph of the only surviving Becket to the King's chamber, probably carved by Rogers.
38. Photograph of the Beckett at the entry way to the hall, less eroded and showing the quality of the relief likely to have been carved into the becket shown in fig. 37.
39. Photograph of the drawing of the timber house shown in elevation
40. Photograph of the drawing of the timber house shown in cross section.
41. Modern reproduction of the drawing of the cross section of the house photographed in fig. 40.
42. Drawing of a bay of Bishop Fox's chantry in Winchester Cathedral.
43. Drawing of a pedestal for sculpture.
44. A proposal for a sepulchral monument to Henry VI.
45. Drawing of 'the castle in the downes' either Walmer or Sandown. (identical designs)
46. Drawing of Deal Castle
47. 1725 plan view of Walmer castle.
48. 1539 plan view of Deal castle.
49. Modern reproduction of fig. 50, a groundplan of the exchequer.
- 50a. Photography of the groundplan of the exchequer building in Calais
- 50b. Key to fig. 50a.
- Figures 51a, 51b, 51c.
 - Fig 51a. Groundplan of the ground floor of the manor house at Hull.
 - Fig. 51b. Groundplan of the first floor of Hull Manor.
 - Fig 51c. Revised groundplan of the first floor at Hull Manor.
- Figures 52a, 52b, 52c.
 - Fig. 52a. Drawing of the fortifications at Hull
 - Fig. 52b. Detail taken from fig. 52a.
53. Drawings of the fortification at Ambleteuse.
 - Figures 53a, 53b, 53c.
 - Fig 53a. A landscape survey of the inlet at Ambleteuse.
 - Fig 53b. A copy of the landscape portrayed in fig. 53a, with fortifications by Rogers.
 - Fig 53c. A copy of the landscape portrayed in fig. 53a, made probably by the King at Whitehall.
54. Drawing of the landscape around Boulogne, showing a red dotted line dividing the territory.
55. Stage diagram for *The Castle of Perseverance*.
56. Diagram from Pierre D'Ailly, showing the concentric rings of the celestial orbs.
57. Rastell's printers mark.

Introduction

i. Definitions.

After Henry VIII's death in 1547 an inventory was taken of all the moveable property stored in the King's numerous houses, palaces and military fortifications. This inventory records that the King's largest collection of household objects was gathered at Whitehall. Whitehall had been extensively re-built after it was confiscated from Cardinal Wolsey in 1529 and over the successive decades of Henry's reign it was the focus of the King's most radical architectural re-designs¹ and was used as the store house for many of his most valuable possessions.² Unlike the inventories of the King's other residences, where objects are listed room by room, the possessions at Whitehall were grouped into types and the thirty five "mappes" are listed after the brief descriptions of eleven "stayned clothes" and fourteen "pictures," and before a series of objects: five "clockes", two "launterns," and "Glasses to looke in". The decision to group all the objects by type rather than by location within the palace forced the royal servants compiling the inventory to decide what images were "mappes" and what were "pictures" or "stayned clothes." Each object is recorded in the inventory by a short written description of its subject matter and from these descriptions alone it is clear that some of the paintings and drawings that were categorised as maps in 1547 would not be categorised in this way if some twentieth century definitions of what constitutes a map were applied to the range of images kept at Hampton Court. Leo Bagrow's 1964 *History of Cartography* begins, for example, with the assertion that "A geographical map is a plane figure representing the surface of the earth, or part of it"³ and Gerald R. Crone's *Introduction to the History of Cartography* also defines the purpose of maps in relation to the "earth's surface."⁴ Some of Henry VIII's "mappes" were of this type

¹ See: Simon Thurley, *Whitehall Palace: An Architectural History of the Royal Apartments, 1240-1698* (New Haven: Yale University Press, 1999), p.37-65.

² *The Inventory of King Henry VIII, Society of Antiquaries MS 129 and British Library MS Harley 1419*, ed. by David Starkey and Philip Ward (London: Harvey Miller Publishers for the Society of Antiquaries of London, 1998), p.ix.

³ Leo Bagrow, *History of Cartography*, (Cambridge: Harvard University Press; London: C. A. Watts, 1964), p.22, cited: Brian Harley and David Woodward, 'Preface', in *The History of Cartography: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean, Vol 1*, ed. by J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987), pp.xv-xxi (p.xv).

⁴ Gerald R. Crone, *Maps and Their Makers: An Introduction to the History of Cartography*, 2d ed. (London:

and the following two entries are examples of drawings that portray “the surface of the earth” or part of it,

Item a large mappe of the whole worlde of parchement sette in a frame of woode havinge the kynhges armes therin.

Item a litle mappe of Englande and parte of Scotlande <Irelande> and brytayne of parchement sette in a frame of woodd.⁵

Yet many of the descriptions of Henry’s “mappes” suggest that they emphasised military architecture, as in the following,

Item the Discripcion of the Castell of millayne painted vppon clothe.

And other “mappes” seem to have focused on military or domestic architecture while also incorporating the portrayal of a period of time, and illustrating a sequence of actions and events, as in the following two paintings:

Item the Discription of the siege and winning of Bolloingne stayned vppon clothe sette in a frame of woode.

Item the Discripcion of a greate huntinge abowte a howse of the Duke of Saxons paynted vppon ~~clothe~~<a borde>

These examples suggest that Bagrow and Crone’s definition of what constitutes a map cannot in fact contain the range of images that were understood as maps in the mid sixteenth century. In 1964, the same year that Bagrow’s *The History of Cartography* was published, the newly established British Cartographic Society argued that the scope of the history of cartography included the “the art, science and technology of making maps, together with their study as scientific documents and works of art,” and it amplified this by

Hutchinson University Library, 1962), p.xi, cited: Harley and Woodward, (1987), p.xv.

⁵ All inventory entries are taken from Starkey (1998), p.240-241.

explaining that "in this context maps may be regarded as including all types of maps, plans, charts and sections, three-dimensional models and globes, representing the earth or any heavenly body at any scale."⁶ While broadening the definition of the map to include "maps, plans, charts and sections," and incorporating celestial as well as terrestrial subjects, as a starting point for the history of cartography this definition of what constitutes a map still fails to include many images which were thought of as maps in the Tudor period, notably those images which portrayed a process or event over time and which emphasised architectural rather than landscape features.

It is against this background that Harley and Woodward's 1987 volume of *The History of Cartography* developed a far more inclusive definition of what constitutes a map:

Maps are graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world.⁷

This definition of the map may be broad but it finally provides the history of cartography with a description that is all-inclusive enough to recognise the range of images that a sixteenth century inventory maker defined as maps. By opening up the definition of the map Harley and Woodward's description implies that the scope of the history of cartography is far wider than twentieth century definitions have allowed but also that the "the map" nevertheless remains a valid category with which to classify objects. It suggests that the variety of images that "facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world" can be usefully grouped together and valuably analysed as part of a modern history of cartography. My own research suggests that this kind of broad definition allows an approach that is more sensitive to the way in which a whole range of graphic representations that facilitate spatial understanding are interrelated.

This thesis uses Harley and Woodward's definition of the map and is situated within a discipline whose range has been vastly broadened by their re-definition of its subject matter. It re-examines the Henrician period in a way that gathers together the images and texts that facilitate "a spatial understanding of things, concepts, conditions, processes, or

⁶ *Cartographic Journal*, 1 (1964): 17, cited Harley and Woodward, (1987), p.xvi.

⁷ Harley and Woodward, (1987), p.xvi.

events” regardless of whether modern critics from a variety of academic disciplines have labelled these documents as topographical or architectural. Before looking at the materials covered by this thesis more closely, there is a key terms which needs to be understood at a preliminary stage of this work. Moreover, when contextualised by an analysis of their Tudor usage, the use of this terms further emphasises the point that a modern history of cartography needs to follow a definition of the map that blurs the boundaries between modern categories of landscape and architectural representation, in order to approach the history of cartography during Henry’s reign.

The sixteenth century use of the word ‘plat’ developed etymologically from an early fourteenth century adjective used to describe how something or more often someone was in a flat or horizontal position.⁸ By the 1350s the word was being used as a noun meaning a “flat object or surface” and by the 1430s the word was used as a name for “an area of land (usually of small extent).”⁹ It is not until 1508 that the word was first used to describe what the OED calls “A plan, a diagram, a design, esp. a ground plan of a building or of an area of land; a map, a chart.”¹⁰ Given its etymological use as a name for any “flat surface” it is possible that the word was used of maps because it described the flat paper or parchment surface of the drawing, but it could also have been used to refer to the small area of land which the page depicted, which could also be called a “plat.” Map and territory are confused in the etymological associations of the “plat” and it is perhaps because of these rich suggestions that the word is adopted so quickly into common usage; despite its first recorded use to describe an image drawn on paper only a year before Henry VIII’s accession the word “plat” is the most common way of referring to local maps and plans in the Royal correspondence and financial accounts of Henrician England.¹¹

⁸ ‘plat, n.2’, *OED Online* (September 2013)
 < <http://0-www.oed.com.catalogue.ulrls.lon.ac.uk/view/Entry/145332> > [accessed November 12, 2013]
 (definition I).

⁹ ‘plat, n.3’, *OED Online* (September 2013)
 < <http://0-www.oed.com.catalogue.ulrls.lon.ac.uk/view/Entry/145333> > [accessed November 12, 2013]
 (definition I.1).

¹⁰ ‘plat, n.3’, *OED Online* (September 2013)
 < <http://0-www.oed.com.catalogue.ulrls.lon.ac.uk/view/Entry/145333> > [accessed November 12, 2013]
 (definition II.2).

¹¹ For more information on the use of the word plat see: Lorna Hutson, ‘Fortunate Travellers: Reading for the Plot in Sixteenth-Century England’, *Representations*, 41 (1993), pp.83-103 (p.86-87); Jerry Brotton ‘Tragedy and Geography’, in *A Companion to Shakespeare’s works*, ed. by Richard Dutton and Jean E. Howard (Maldon: Blackwell, 2003), p.221.

During Henry VIII's reign the word "plat" is used to describe drawings of both landscape and architecture. In its earliest recorded uses the word "plat" refers to drawings of buildings, as in a 1513 chancery suit which refers to a house built by two carpenters "according to a platte thereof made by your said Oratours and delyveryd to the said James Yarford to the entent the same James should have sygned the same platte with his owne hande."¹² The word is used to describe architectural drawings throughout the 1530s as in the financial accounts of Hampton Court for 1537 which record that Clement Dickenson, the King's master mason claimed 'for hys rydyng costes to the Kynges grace with sondry plats' of Oatlands, where one of the King's palaces is being re-designed.¹³ But the word "plat" is also used to describe maps made of local landscape in the 1540s, as when Edward Seymour the Earl of Hertford writes to the King in 1546 and suggests emendations to Henry's proposed design of some new fortifications at Ambleteuse, suggesting that the place or "lien" (in this case a sea haven) does not suit the King's design. He states, "I do perceave that my lord with the rest afforsaid, do fynd the lien more propice to fortife with foure bulwarke then with fyve, wherof his lordshipp, I doubt not, wold veray sone more amplye signifye unto your maiestie by platt."¹⁴ In the same year as the design of the works at Ambleteuse Henry was also involved with negotiating the details of the territorial boundary between England and France and he demanded that his ambassadors in Boulogne ask the French to "leave to our quiet possission Bulloyn and suche parte of Bullonoys and the Countie of Guysnes, as shalbe signified unto you [the English ambassadors] by a plat, assone as Rogers, who is already sent for, may comme and go unto you."¹⁵ As these examples suggest, both architectural and topographical drawings were called plats by both the masons and the King who used them as part of their correspondence and when looking today at the surviving examples of this work it is often unclear whether an image is architectural or topographical: a single drawing often portrays landscape features, the shape of an estuary, for example, and a fortification, which responded to the existing natural advantages provided by a haven. The broadening out of the definition of the map allows a modern cartographic historian to look at both types of drawing without having to

¹²L.F., Salzman, *Building in England Down to 1540, a Documentary History* (Oxford: Clarendon, 1952), p.15.

¹³*The History of the King's Works Vol. IV 1485- 1660 Part II*, ed. by H.M. Colvin (HMSO: London, 1982) p.208; see also Chapter three, below.

¹⁴London, The National Archives, MS SP 1/ 216 f.74r.

¹⁵ The National Archives, MS SP 1/218 f.19v.

impose modern distinctions between architectural and landscape subject matter. This thesis will argue that the tendency to divide a history of cartography from a history of architectural drawing has anachronistically separated maps according to modern disciplinary divides. It will suggest that the Henrician local map can best be understood by examining the cross over between architectural drawing and landscape representation as masonic drawing skills developed first in the thirteenth century are taught to and used by sixteenth century masons to produce maps that contained architectural and landscape content. The broadening of the definition of the map allows for a new type of cartographic history, one which can analyse the way in which images that facilitate a spatial understanding of things and processes were connected in the Tudor period, and move flexibly over modern disciplinary boundaries.

The wider problem issues of definition explore is that our own responses to the period are deeply conditioned by the kinds of distinctions we draw between, for example, an architectural plan and a landscape map, or the kinds of interests we assume are commonplace, such as a concern with an accurate image of the globe's surface. Modern expectations about what does and does not constitute the map and its context provide a set of criteria that tend to super-impose themselves over our examination of a historical period. While what one critic has called "the profound intellectual gulf"¹⁶ between a modern and a sixteenth century way of using the map is not something that can, to extend the metaphor, finally be crossed and the whole issue of context specific reading resolved, there are nevertheless gradations in the sensitivity of modern critical readers to the effect of their own pre-conceived ideas. This thesis aims to encourage a way of looking at Henrician maps that is better attuned to the local circumstances in which they were made and used. The same, entirely modern, way of understanding what constitutes a map or its context may also work to distort a reading of this thesis, for my study moves into areas that to a modern reader may seem unrelated to a history of maps. However, these category distinctions are exactly what this study would question and I would argue that we need to take a far broader and more long term view of the contextual environment of the Henrician map to include architectural texts and images.

¹⁶ John Hessler, *The Naming of America; Martin Waldseemüller's 1507 Map and the Cosmographiae Introductio* (London, GILES: 2007), p.63.

ii. Critical review and Methodological Approach.

In 1985, in an introductory essay to *The History of Cartography*, Brian Harley wrote that,

The historical importance of maps has often been indexed to the progress of mapmaking as a scientific and practical skill, and this view is still deeply entrenched in the writings on cartographic history. Gerald R. Crone's words, written in 1953, that "the history of cartography is largely that of the increase in the accuracy with which elements of distance and direction are determined and. . . the comprehensiveness of the map content,"¹⁷ still have a measure of acceptance. Other writers have pointed out that the history of the map relates how many have striven to establish cartography as a precise science;¹⁸ that it is concerned with measuring the "rate of cartographic progress"¹⁹ and that it involves the study of "scientific conquest of the unknown."²⁰

As Harley suggests, the methodological approach of mid-twentieth century geographers, historians and cartographers in essence attempted to write a history of cartography that denied the very historicity of the maps themselves,²¹ producing, in the process, a whole corpus of literature which traced the development of modern cartography through maps made during historical periods in which there was no concept of sharpening the accuracy with which "distance and direction" were determined, or "of cartography as a precise

¹⁷ Gerald R. Crone, *Maps and Their Makers: An Introduction to the History of Cartography*, 1st ed. (London: Hutchinson University Library, 1953), p.xi.

¹⁸ C. Bricker and R. V. Tooley, *Landmarks of Mapmaking: An Illustrated Survey of Maps and Mapmakers*, preface by Gerald R. Crone (Brussels: Elsevier-Sequoia, 1968), p.5.

¹⁹ R. A. Skelton, *Maps: A Historical Survey of Their Study and Collecting* (Chicago: University of Chicago Press, 1972), p.106.

²⁰ Lloyd A. Brown, *The Story of Maps* (Boston: Little, Brown and Company, 1950), p.4; For the original extract from *The History of Cartography* see Brian Harley 'The Map and the Development of the History of Cartography' in *The History of Cartography: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, ed. by J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987) pp.1-42 (p.3).

²¹ Christian Jacob, *The Sovereign Map: Theoretical Approaches in Cartography Throughout History*, (Chicago: University of Chicago Press, 2006), p.4.

science.” R.A. Skelton’s 1972 book called *Maps: A Historical Survey of Their Study and Collecting* uses a spatial metaphor to describe the history of the map. He writes,

I propose to trace briefly the evolution of map making as a craft during the period... the mental picture which it suggests is that of a track heading over successive false crests or watersheds, but separated by sections of level or downhill going. Without taking a cataclysmic view, we may find it helpful to isolate in our minds the points of more prominent relief. They give us a series of chronological horizons as an index to the competence and character in any given age.²²

Skelton’s writing here exemplifies what is by one critic called the neo-Darwinian model for map history.²³ The history of the map is seen as a competitive process in which new developments within one type of map lead to the suppression of all others and the emergence of a “better” and more “successful” line of images. Skelton blends this evolutionary model with the metaphor of an ascent upwards towards more complex and functional life, describing the process of map history as a gradual but inevitable climb up and over a series of crests towards a final peak. The passage takes it for granted not only that there are absolute standards of right and wrong, falling and rising, but that the reader will agree that these standards are based around cartographic “competence.” The following passage, from Jerry Brotton’s recent *History of the World in Twelve Maps* describes how his history of the map is to be visualised in contrast with Skelton’s own:

The maps examined are the creation of cultures which perceive physical, terrestrial space in different ways, and these perceptions inform the maps they make [...] each map is as comprehensible and logical to its users as the other, be it the medieval Hereford *mappamundi* or Google’s geospatial applications. The story told here is therefore a discontinuous one, marked by breaks and sudden shifts, rather than the relentless accumulation of increasingly accurate geographical data.²⁴

²² Skelton (1972), p.6.

²³ Catherine Delano-Smith and Roger Kain, *Local Maps: a History* (London: British Library, 1999), p.5.

²⁴ Jerry Brotton, *A History of the World in Twelve Maps* (London: Allen Lane, 2012), p.14.

In contrast with a metaphor that asks us to imagine map history as a relentless journey that may occasionally lose the path but which treads inevitably up towards a summit, Brotton suggests that the history of the map is “discontinuous,” broken and without a final end point. The metaphor of a gradual and continuous journey is rejected by Brotton on the grounds that there are no absolute or trans-historical standards against which the historical map can be evaluated. Skelton’s metaphor of the single path winding up a mountain is broken apart by an argument which states that there is no slope for maps to climb, there is only, for each individual map, the local and discontinuous needs and expectations of map makers and users.

The work of Mathew Edney has helped to clarify the assumptions in what he calls the “empiricist” position of cartographers like Skelton and Crone. He argues that their work is based on the ontological assumption that the world possesses a quite unambiguous existence, and that this existence can be fully expressed by maps which record the spatial location of its various parts using geometrical projections.²⁵ Furthermore, he suggests that by confusing maps made using different source materials and created for different purposes, historians and cartographers have been able to compare historical maps against an idealised set of spatial, geometrical data and create a canon of “Great Maps,” each representing an advance in technology.²⁶ However, as Edney points out, “once we decide that there is more to geographic data than their geometrical definition, and that the practice of cartography is more than the collection or replication of this data, then the empiricist conception of cartography rapidly disintegrates.”²⁷ Edney’s criticism of the “empiricist conception” of cartography draws heavily on the work of J.B. Harley, who, in the late 1980s, questioned what he called the “positivist” assumptions used in the history of cartography on similar terms.²⁸ However Harley’s attempts to establish a new methodology

²⁵Mathew Edney, ‘Cartography without ‘Progress:’ Reinterpreting the Nature and Historical Development of Map Making’, in *Classics in Cartography: Reflections on Influential Articles from Cartographica*, ed. by Martin Dodge (Chichester, UK: J. Wiley & Sons, 2011), pp.305-329 (p.307).

²⁶Edney (2011), p.309

²⁷ Edney (2011), p.310.

²⁸ See, for example, a passage from one Harley’s essays in which he questions a methodology that relies on the assumptions that “the objects in the world are real and objective, and that they enjoy an existence independent of the cartographer, that their reality can be expressed in mathematical terms; that systematic observation and measurement offer the only route to cartographic truth; and that this can be independently verified.” See: Brian Harley, ‘Deconstructing the Map’, in *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), pp.149-68 (p.154).

for the history of cartography after the “rapid disintegration” of a “positivistic” model have since been seen as inherently problematic.

Harley’s critical work was begun within the traditional lines of the “positivistic” model, working extensively on a variety of historical periods, but particularly the history of the Ordnance Survey in the nineteenth century.²⁹ However, in the 1980s, he performed what has been called a “remarkable volte-face”³⁰ that was influenced by a methodology adapted from the work of art historians, particularly that of Erwin Panofsky. Panofsky’s “iconological” approach argued that cultural principles were “unconsciously qualified” by the artist and “condensed” into an artwork so that the “intrinsic meaning” of a work could only be understood “by ascertaining those underlying principles which reveal the basic attitude of a nation, a period, a class, a religious or philosophical persuasion.”³¹ Given this unconscious and un-verbalised connection Panofsky suggests that the role of art history was to record the interconnections between art and its cultural context.

Following this approach, Harley’s work treats maps as cultural texts whose meanings need to be decoded using an analysis of the “underlying principles” that structured a period. However Harley’s formulation of these principles has been questioned. As Dennis Cosgrove comments, there were no established conventions or specific methods that would ascertain a set of cultural principles in Panofsky’s work, they were to be reconstructed by a kind of detective synthesis that searched out analogies between overtly disparate forms³² and Harley has been criticised for eliding the complexity of map use within historical and social interactions, and avoiding a materialist analysis of the maps themselves. As J.H. Andrews suggests, in place of the kind of contextual analysis that is verifiable through historical research into archival or secondary sources, Harley uses the partial lens of Foucaultian theory to find unverifiable evidence of the extension and authorisation of

²⁹ For an appendix containing a full bibliography of Harley’s works arranged chronologically see: *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), p.28-296; For an introduction to Harley’s work on the Ordnance survey map see: Brian Harley, ‘Introduction’, ‘The Ordnance Survey Maps of Scotland’, and ‘Conclusion’, in *The Historians Guide to Ordnance Survey Maps*, ed. by J.B. Harley and C.W. Philips (London: National Council of Social Service for The Standing Conference for Local History, 1964), pp.5-6, 42-50 and 51.

³⁰ Brotton (2012), p.399.

³¹ Erwin Panofsky, ‘Iconography and Iconology: an Introduction to the Study of Renaissance art’, in *Meaning in the Visual Arts* (Harmondsworth: Penguin, 1970), pp.51-81 (p.64), cited in Dennis Cosgrove, ‘Introduction: Iconography and Landscape’, in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*, ed. by Denis Cosgrove and Stephen Daniels (Cambridge: Cambridge University Press, 1988), pp.1-10 (p.2).

³² Cosgrove (1988), p.2.

state control in historical maps from all periods.³³ Both Jess Edwards and J.H. Andrews point out that in trying to use maps as cultural texts, Harley is forced to look for evidence of how maps extend state control outside the maps themselves: in art history, literary criticism, architecture, and music – but also ‘non-cartographic’ elements of the maps themselves, including ‘decorative embellishments.’³⁴ In consequence, Edwards suggests that Harley “over-reads the map, reifying and totalizing its meaning; filling its apparent silences with misplaced rhetorics from elsewhere.”³⁵ Furthermore, through this totalization Harley is criticised for furthering the work of the representational practices he describes, perfecting their forms and re-incorporating that which escapes them as part of the ‘system.’³⁶ Harley’s work is criticised for “totalizing” the meaning of the map, filling its ambiguous gaps and “silences” with evidence drawn, often, from outside sources. The result is that maps throughout history are repeatedly contextualised by arguments which describe the extension and authorisation of powerful institutions. Nonetheless, Harley’s writing marks an important point of transition in the history of cartography and the work of those critics critiquing Harley have provided a methodological starting point for this thesis.

As an alternative to Harley’s view, Robert Rundstrom argues that maps need not be analysed as the “end-products” of a cultural system that constantly replicates images which legitimise its hierarchy, and may in fact be part of an ongoing “process still in motion.”³⁷ Rundstrom argues that map-making is “an open ended endeavour” and that “as mapping continues in whatever context, a dialogue continues among cultures, and between people and the physical environment. Cartographers tap in at some point, but no conclusive ‘end result’ is ever reached.”³⁸ Rundstrom’s argument draws our attention to the importance of analysing how maps are used by communities over time as part of a continual process. Rather than looking at a map as an end-product that is the “unconscious qualification” or “condensation” of a historical social system by a single contemporary cartographer, he

³³ See J.H. Andrews, ‘Introduction; Meaning Knowledge, and Power in the Map Philosophy of J.B. Harley’, in *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), pp.2-32 (p.31-32).

³⁴ Jess Edwards *Writing, Geometry and Space in Seventeenth-Century England and America: Circles in the Sand* (London: Routledge, 2006), p.6, citing J.H. Andrews, (2001), pp.2-32 (p.11).

³⁵ Edwards (2006) p.6.

³⁶ Edwards (2006) p.6.

³⁷ Robert Rundstrom, ‘Mapping, Postmodernism, Indigenous People and the Changing Direction of North American Cartography’, *Cartographica*, Vol. 28, No. 2, Summer (1991), pp.1-12 (p.6).

³⁸ Rundstrom (1991), p.7.

suggests that maps are part of a dynamic process of change and alteration that is driven by map use within a social group. He suggests that this social group is engaged in an on-going process of creation and feedback that leads to a history of the cartography that moves in a non-linear, undetermined way based on local historical circumstances. Rundstrom's argument provides a powerful starting point for a history of cartography that is neither the history of the "progress" of the map according to what Edney calls "empiricist" cartography, nor is it the history of how, within the determinist social system described by Harley, the map was used to legitimise a social hierarchy and/or the power held by governing institutions.

My own methodology seeks to combine Rundstrom's emphasis on the importance of analysing the interrelationship between map use and map making, and his argument that types of map use are historically specific, open ended, constantly fluctuating as social and cultural circumstances change. With the broadened definition of the map provided by Harley and Woodward it is now possible to look at how a range of images used to represent spatial relationships co-existed in the early sixteenth century and to look at how this newly enlarged group of maps were used and shaped by their situation within a process of social communication. The work of Harley and the "empiricist" map historians that preceded him also foregrounds the importance of attempting to identify and question meta-narratives used to pre-determine the description of how maps change over time. My work contextualises local maps made during Henrician period using extensive primary evidence without making claims that the trans-historical relevance of the historical changes I identify can be used as models or templates with which to analyse other periods of cartographic history.

Map historians have recognised the need to move between images connected by historical context and by a shared concern with the facilitation of a spatial understanding, regardless of the position of modern disciplinary boundaries. This thesis explores the potential offered by this re-definition of the map while also seeking to disassociate itself from the meta-narratives within criticism that have shaped approaches to the extant evidence of the period. With an approach that attempts, in Edney's words, "to build its understanding from the ground up, within a broad and flexible conceptual framework,

rather than impose a priori presumptions”³⁹ about the definitions of the map, or its historical development, there is room for major reinterpretations of map history and for precise studies of individual cartographic conventions.⁴⁰

iii. Chapter Summary

This thesis examines an unexplored contextual background for sixteenth century local maps. This work begins by looking at the graphic skills taught to the master masons who made the most innovative local maps of the Henrician period before moving on to examine how, through a dialogue with Henry VIII that is recorded by extensive correspondence, these masons shaped the development of the local map in the Henrician period. The first part of chapter one argues that the architectural drawing techniques first developed by master masons in the late twelfth century continued to be taught to the King’s masons well into the sixteenth, and that these traditional masonic techniques lie behind the innovations in sixteenth century local mapping. This work challenges recent cartographic histories which tend to argue that an itinerant German or Italian introduced changes within the local map under the patronage of Henry VIII, despite the fact that no documentary or pictorial evidence of any individual has been found.⁴¹ This chapter begins by analysing two drawings of the castle at Guines. Made in 1541, these images are the first English drawings to be constructed using numerical scale and a consistent projection and my work provides an explanation of how they were made, working out the material techniques, tools and graphic skills that were used to construct them.

Part two of this chapter provides an explanation of how buildings were designed in the medieval period, and part three focuses on the origins of the techniques used to

³⁹ Mathew Edney, ‘Reflections Essay: Progress and the Nature of Cartography’, in *Classics in Cartography: Reflections on Influential Articles from Cartographica*, ed. by Martin Dodge (Chichester, UK: J. Wiley & Sons, 2011), pp.331-342 (p.339).

⁴⁰ Edney (2011), p.339.

⁴¹ See for example, Merriman’s argument about the influence of Italian craftsman: see Marcus Merriman, ‘Italian Military Engineers in England in the 1540s’, in *English Map making 1500-1650*, ed. by Sarah Tyacke, (London; British Library, 1983); also: R.A. Skelton, ‘The Military Surveyors Contribution to British Cartography in the 16th Century’, *Imago Mundi*, XXIV (1970), pp.77-83; Peter Barber suggests that German craftsmen are responsible for introducing technical changes, see: Peter Barber, ‘Map Making in England ca.1470-1650’, in *The History of Cartography: Cartography in the European Renaissance, Vol. 3, Part 2*, ed. by David Woodward (Chicago: University of Chicago Press, 2007), pp.1589-1669 (esp. p.1607); see also chapter one of this thesis, which explores this argument in more detail.

construct the sixteenth century drawings of Guines castle within the routine processes taught to and used by masons between 1200 and the 1550s. The final part of this chapter examines why small drawings of the complete building made to a numerical scale were not used to design Gothic architecture, despite the fact that all the techniques required to construct scale drawings were known to and used by master masons in different kinds of design drawing. I suggest that the precise conditions of the medieval building site and the contextually specific forms of design practice and building construction made such images unnecessary, and that, as later chapters will explain, it is only under the pressures imposed by the patronage of Henry VIII that the traditional skills of the English master masons are combined in new ways to make the scale drawings of landscape and architecture that we see in the 1530s and 1540s.

Chapter one of this thesis argues that in order to design and construct their buildings masons as early as the 1190s developed a style of drawing that I refer to as “technical drawing” (while acknowledging its anachronism). Chapter two looks at the images that were made by masons for patrons at a preliminary stage of the building process as a way of recording the contractual obligations of the builders, and clarifying what work had been agreed. These drawings are referred to as “pictorial drawings” and up to the 1530s they have a history that is largely independent of the technical work that is made by masons for the use of other masons working in the stoneyard.

The body of this chapter examines some of the extant examples of these pictorial drawings, and concludes that though these images were not made to scale and tend to distort their subject in ways that would have limited their use in the actual construction of the works, they nevertheless precisely fulfilled their function: allowing patron and builder to record the results of a preliminary negotiation and standing as contractual records in case of any later disputes. Following an examination of some examples of pictorial drawings, this chapter explores how pictorial and technical drawings would have facilitated different kinds of map use. As opposed to the technical drawings examined in chapter one which could be modified, re-drafted and compared by the masons working on the images, the pictorial drawings made for patrons before the 1530s seem to have been passive records of a building project that was largely worked out verbally. However, under Henry’s patronage masons began to make less pictorial drawings and started to incorporate the graphic techniques previously employed in images that circulated among the masons themselves

into small, on-paper works made for the royal patron. With this shift in graphic style the King was able to use drawings to modify, adapt and re-draft design images in ways that had not been possible when patrons were provided with pictorial drawings and tended to verbally work out construction details with their builders.

Chapter two concludes by arguing that the negotiations between patron and builder are part of a shifting balance between word and image. However, this cannot be seen as a smooth or linear transition and masons and patrons throughout Henry's reign are continually striking a balance between the use of words and images in order to agree a contractual starting point for a building. As the examples of pictorial drawings and written contracts discussed in this chapter show, each encounter between patron and builder is unique and the types of written and graphic documents used to communicate depend in each instance on the capacity of both parties to understand and use technical drawings and/or technical vocabulary.

Having established who was making Henrician local maps; analysed the historical origins of their graphic skills and considered the kinds of pictorial works that were made for patrons before Henry's accession, this thesis now moves on to focus on the local maps made for and used by Henry himself. Modern critical work on the Henrician local map tends to focus on the years between 1539 and 1547 during which period Henry VIII attempted to protect English territories by building a network of fortifications along the boundaries with Scotland and France, many of which were designed using maps that were sent to the King. It seems that after the fortification programme of 1539 was commenced maps were stored at Whitehall far more systematically than during an earlier period. However, chapter three argues that local maps incorporated the technical idiom during the design of Whitehall and Hampton Court in the early 1530s, nearly ten years before the fortification programme was begun. This chapter begins by examining the documentary evidence of Henry's use of plats which is limited to the financial accounts that describe the purchase of materials and the travelling expenses claimed for taking plats to the King from the Royal works at Hampton Court, Oatlands and Nonsuch. Two men, William Clement and Christopher Dickenson were responsible for drafting these images and taking them to the King throughout the 1530s and though none of these drawings has survived, some of the work made by these men after they were transferred to military building sites in 1539 were retained at Whitehall. These drawings give us some idea of the kind of images that were being made for Henry during the

1530s and Clement and Dickenson were certainly using the technical idiom to make small, paper plans for the King by 1539 at the latest. However, this chapter suggests that the technical mode was incorporated into Henry's plats far earlier. The date for this transition can be pushed back to at least to 1534, from which year there survives an anonymous drawing of the King's apartments in Calais which was made using the standardised conventions familiar from Gothic architectural drawing made at full scale.

This chapter also examines the work of David Starkey and Simon Thurley,⁴² and suggests that their arguments provide an explanation of why Henry might have become personally involved in the design of his domestic palaces in the 1530s. Starkey's work argues that controlling the design of the privy chambers that surrounded the King was a way of managing Henry's noblemen by limiting their access to the King's person. My work provides material evidence that drawings made for patrons were made in a technical mode from at least 1534, and that these images would have enabled the King to design, alter and re-draft the drawings provided by his masons and so actively manipulate the domestic spaces which Starkey suggests enabled monarchs to control the members of both the privy chamber and council.

Chapter four continues the chronology begun in Chapter three. It examines the letters and plats which provide evidence of the King's use of plats from the period after the 1539 fortification programme, from which point an increasing number of plats have survived. The evidence from this period suggests that the King is using written correspondence and technical plans to control the royal works being made around the borders of England and the pale of Calais. The evidence provided by a group of letters sent between Whitehall and Boulogne suggests that the King was using plats to alter and re-draft the designs being made by his master mason on site, and that all design decisions were sent to London for approval by the King before being commenced. Later letters sent from the works at Ambleteuse describe how the King had designed a set of fortifications that responded to the natural advantages of the haven at Ambleteuse without having seen the

⁴² Starkey's work on the subject is extensive but see esp.: David Starkey, 'Introduction: Court History in Perspective', in *The English Court: from the Wars of the Roses to the Civil War*, ed. by David Starkey (London, 1987), pp.1-24; 'Intimacy and Innovation: the Rise of the Privy Chamber, 1485-1547', in Starkey (1987), pp.71-118; 'Court and Government', in *Revolution Reassessed: Revisions in the History of Tudor Government and Administration*, ed. Christopher Coleman and David Starkey (Oxford, 1986), pp.29-58; see also: Simon Thurley *The Royal Palaces of Tudor England : Architecture and Court Life, 1460-1547* (New Haven, Conn.: Yale University Press, 1993), p.36-39.

site, and it seems that landscape maps were being sent back to Whitehall in order to allow Henry to set out his fortifications according to the natural advantages of the local landscape. This chapter explores Henry's use of maps drawn in the technical idiom in the 1540s and it concludes the trajectory of the first four chapters by looking at the kinds of map use that are possible for a lay patron once the technical idiom used by master masons is incorporated into small, paper plats. Furthermore, it examines how map use and map making were interconnected, looking at how correspondence between King and craftsmen shows patron and draftsmen engaged in a continual loop of creation and feedback that shaped the form of the local map.

It also examines the transition between the technical representation of architectural and landscape features, for during this period graphic skills that had been used to represent architectural groundplans in an earlier period begin to be used to portray local landscapes both as a preliminary to the design of architectural work, and as a way of resolving territorial disputes, as at the negotiations around the treaty of Camp. Given the transition analysed in this chapter, my work also confronts modern critical theory on landscape and its representation, particularly Alexandra Walsham's work on landscape and the reformation.⁴³ It argues that the mason's skills and the demands of Henry VIII provide a unique context for map use during the latter years of Henry's reign, and that this small coterie of correspondents used maps to approach landscape in a way that needs to be isolated from wider contemporary trends towards interpreting landscape as a representation of religious and historical meanings.

This study of Henrician maps argues that Henry VIII and his master masons use local maps in consistent ways and this thesis analyses the way local maps developed over time to represent an increasingly wide range of subject matter using a standardised form of numerical scale and an increasingly consistent set of graphic conventions. It examines a continuous development over time because the practices and community that surrounded local maps suggests that such an approach is valid. This approach to the local map began with an analysis of the contextual environment of the map itself and it is not concerned with a narrative that attempts to suggest that Henrician maps "progress" or fail to move

⁴³ Alexandra Walsham, *The Reformation of the Landscape: Religion, Identity, and Memory in Early Modern Britain and Ireland* (Oxford: Oxford University Press, 2011).

towards the modern map.⁴⁴ . This approach attempts to negotiate the divide between modern and Henrician map use and encourage a way of looking at Henrician maps that is better attuned to the local circumstances in which they were made and used.

⁴⁴ The rejection of the idea of cartographic “progress” is notably discussed in Edney (2011), p.305-342.

Chapter One. The Influence of Medieval Architectural Drawing over the Plats of the Sixteenth Century.

The most prolific and technically advanced of the map makers working for Henry VIII was John Rogers, a master mason trained in the stoneyard of Hampton Court in the early 1530s.¹ Roger's produced the first English drawing made to a consistent numerical scale in 1541 when drafting a set of plans used by the King and his councillors to re-design the castle at Guines. My contention is that Rogers developed scale drawing in response to the pressures imposed by the patronage of Henry VIII in the 1530s and 1540s, but that the skills required to construct scale drawings were in regular use by master masons throughout the Middle Ages and continued to be taught to masons like Rogers and his contemporary Richard Lee well into the sixteenth century.² Chapters two and three look at the patronage of Henry VIII, while chapter one focuses on the techniques used to construct plats in the sixteenth century and outlines a history of how these techniques were used in the medieval drawing and design practice of the master mason. Given that the technical and conceptual skills required to create small scale drawings were in regular use from the late 1100s, this chapter concludes by examining why scale drawings of a complete building were not made at a date far earlier than 1541. As later chapters will show, Henry's own influence is important to the combination of old graphic techniques in new ways but there is also evidence to suggest that prior to the reign of Henry VIII the structure of the medieval building site itself discouraged the use of small scale, numerically consistent drawings of the complete works.

For clarity's sake the chapter is divided by four subheadings. Section one analyses Rogers' 1541 drawings of Guines and provides an explanation of how they were made. Section two gives a history of the types of drawing used to design and construct buildings in the middle ages. Part three connects the sixteenth century plats to design drawings made at Byland Abbey in the 1190s and at Wells in the 1290s, examining how the techniques used to construct the images of Guines were an integral part of medieval drawing and design practice. Part four examines the structure of the medieval building site and explains why

¹ For further biographical details see Chapter two part i. See also: Lon Shelby, *John Rogers, Tudor Military Engineer* (Oxford: Clarendon, 1967).

² For further information on Richard Lee see: J.H. Harvey, *English Mediaeval Architects : a Biographical Dictionary down to 1550* (Gloucester: Sutton, 1984), p.161-162.

scale drawings of complete buildings were not used during the middle ages, despite the strong evidence of the requisite graphic skills being routinely used.

i. A Study of the Techniques used to Construct the Scale Drawings of 1541.

Despite the fact that John Rogers' drawings of Guines are the first examples of English drawings made to a numerical scale, these images have not been given sustained critical attention and there is, in part, an unfortunate co-incidence of dates to blame for this gap, for English masons drawing images for the King developed scale drawing in 1541 at a time when Henry VIII was also employing Italian architects.³ The assumption, prevalent through most of the twentieth century, has been that it was these Italian craftsmen who introduced scale drawing into England.⁴ However, there is no evidence that the technique was learned in this way, as the foreign engineers who were working in England were not drawing to scale at a date early enough to have taught the technique to English masons. Even Marcus Merriman, whose article strongly supports the idea that the Italian engineers introduced scale drawing to England is forced to conclude that "We cannot ignore the fact that English scale maps were being executed before the work of Scala, Bergamo, Arcano and Rossetti,"⁵ the principle Italian engineers in England. The easy reliance on the influence of Italian engineers over English cartography has meant that scholarship has largely neglected the drawings of Guines, supposing that they were derived from the teachings of an Italian craftsman who has left no archival trace of his existence.⁶ As yet, there has been no attempt to examine the Guines drawings as a point of origin for scale drawing independent of Italian influence.

Under conditions where scale drawing has been seen as a complete form rather than a series of processes, it has been too easy assume that this total graphic system was taught to English masons in its entirety by Italian engineers. However, by foregrounding the

³ The best analysis of these images is made in Lon Shelby (1967), p.5-23; Anthony Gerbino and Stephen Johnston, *Compass and Rule; Architecture as Mathematical Practice 1500-1750* (New Haven, Conn.: Yale University Press, 2009), p.31-44.

⁴ See Marcus Merriman, 'Italian Military Engineers in England in the 1540s' in *English Map making 1500-1650*, ed. By Sarah Tyacke, (London; British Library, 1983), p.63-66.

⁵ Merriman (1983), p.65.

⁶ See: P.D.A. Harvey, 'The Portsmouth Scale Map and the Origins of Scale Drawing', in *Manors and Maps in Rural England from the Tenth Century to the Seventeenth* (Farnham: Ashgate Variorum, 2010).

techniques which are used to construct a scale drawing, the form can be reduced to a series of practices which use tools, drawing techniques and conventions whose origins and use in England can be traced. Looking at scale drawing as a series of processes alters the sense that scale drawing is a complete form of indeterminate complexity and probably alien extraction. This section focuses on the two kinds of process that *must* take place for an accurate scale drawing: primarily, a survey of the landscape or architectural features using some form of measurement and secondarily the use of a set of drawing conventions that can record the information produced by this survey in a graphic form on the page. With a more detailed idea of what kinds of survey and conventions were used to construct scale images in 1541 it ought to be possible to note the extent of foreign influence, or to trace the origins of the various techniques used to draw to scale back into English drawings of the medieval period.

When thinking about what tools, methods and graphic techniques are required to construct a scale drawing, there is clearly a difference between the methods behind a drawing that records a to-scale form of *existing* landscape or architectural features and one that draws out a set of proposed works on flat ground. A representation of architectural works on a site where there are no existing features can be drawn to scale without the need for a survey because the site is a blank design space that is analogous to the blank page. In contrast, constructing a scale plat whose design responds to existing landscape features is a process which must start by drafting out the shapes of the existing structures and obstacles on the page as a set of limiting boundaries, and information about these features has to be gathered in a preliminary, measured survey. The first plats drawn to scale in Tudor England are architectural designs for fortifications, and it is often difficult to know whether they propose an entirely new set of works on a flat surface, whether they are based on the shape of existing landscape features, or whether they show a mixture of existing and proposed works without clear definition between what is planned or what has been built. Considering the type of topographical survey which lies behind early scale images - especially where a drawing is the first image we have of a site - involves looking at written records to uncover the extent of older works and deciding how far the image responds to existing features. Fortunately, at Guines, this history is relatively clear.

The first scale drawing of Guines is actually part of a pair of drawings reproduced in figures 1 and 2. Figure 1 represents the defensive walls around Guines as they stood c.

1540,⁷ and it charts the parallel curves of the medieval walls and moat that were mentioned in English records as early as 1352 when the English captured the castle.⁸ The walls as drawn in 1540 probably retain the shape in which they were laid out in this medieval defensive scheme. It also shows the siting of a round building that interrupts the enceinte which it labels as 'The keipe.' The walls of Guines, which no longer stand, were built on the crest of the hill, so the curves and indentations of the walls are probably explained by the profile of the landscape on which they were built. The drawing also shows the works constructed and maintained throughout the 1400s: two Bulwarks sited to the north-east and north west of the circular keep which it names as 'Pyrtons' and 'Whettelis' bulwarks, structures on which, under these names, on-going repairs were carried out right up to the point at which new works were commenced in 1539.⁹

Figure 2 is a drawing of a new set of bulwarks at Guines, where, building accounts confirm, work had been started as part of Henry's massive re-fortification works in 1539. Closer examination of the bulwarks in this drawing, closer than the reproduction allows, reveals that they are surrounded and intersected with ruled lines, faint arcs and intersecting curves drawn using a compass and bisecting the symmetrical shapes of the bulwarks. These construction lines suggest that the bulwarks were constructed geometrically rather than by a survey, and there is no evidence to show that such structures were ever completed. The irregular oval of the wall on which these Bulwarks are sited has a very similar shape to that of the survey of the medieval walls drawn in figure 1. These two points of evidence suggest that figure 1 is a working drawing of the existing walls that was constructed using the information collected in a preliminary survey of the medieval castle on the hill, and that the plan of the new defences in figure 2 are drawn over a copy of figure 1, whose oval representation of the shape of the existing walls is used to guide the placement of bulwarks at the most effective defensive positions around the irregular shape.

Ordering the plats in this way raises questions about how the measured survey used to construct figure 1 was conducted and how the information gathered in the survey was translated into the extant image. There are no contemporary English sources or, indeed,

⁷ See BL. Royal MS. 7. C. XVI. f 81. The best record of the walls as they stood before 1540 is this letter (Its author is unknown as the first section has been lost) to Edmund Knyvet, sergeant-porter to Henry VIII, which takes the form of a written survey describing the works at Guines.

⁸ London, The National Archives, MS E. 101/173/7, records that in 1532 the English dug 221 rods of ditch in order to strengthen their position at Guines. see Shelby (1967), p.7-8.

⁹ See H.M. Colvin *The History of the King's Works, Vol. I* (London, 1963), p.453.

modern critical works on English material that might guide an answer to this question, and while one has to be sensitive to England's relative isolation from continental techniques, European sources offer a starting point from which to consider possible solutions.

The tools and techniques that Leonardo Da Vinci used to construct a map of Imola in 1502 have been meticulously examined by John Pinto in his article on the development of European city plans. He describes Da Vinci's use of two instruments: firstly a tool for measuring distances, a large wheel of set circumference, one *braccia*, which, on each complete revolution, moved a system of gears so that a small cogged wheel within the device clicked along one cog-notch with the passage of each mile; secondly a transit, which consisted of a circular dial-like surface with its circumference divided into eight parts corresponding to the eight winds. At the centre of this disk was a movable sight vane and a magnetic compass, from which, in setting up the instrument for surveying, magnetic north was taken and lined up with the north (*tramontana*) engraved on the dial.¹⁰ Pinto explains the use of these instruments in the following passage:

The essential fieldwork for a plan like that of Imola consisted of two operations: establishing the orientation (relative to magnetic north) of each facet of the irregular shape being surveyed and then measuring each facet. This process is most easily illustrated by one of Leonardo's drawings relating to the fortifications of Cesara. [...] Figure 3 represents almost the entire circuit of the city's defences, which, due to the contours of the site, enclose an irregular, many faceted polygon. At each turn of the walls Leonardo moved [the segmented dial of] his transit, aligned it with regard to the north [on the compass], and sighted the new stretch to be plotted [by looking through the movable sight vane]. The direction of the sight vane relative to north was noted, thus establishing the wall's orientation, and the new stretch was measured. The numbers on the inside of the line of defences in figure 3 denote the orientation of each segment of wall in degrees of the compass, while those on the outside indicate the length of every facet in braccia.

¹⁰ John Pinto, 'Origins and Development of the Ichnographic City Plan', *Journal of the Society of Architectural Historians*, 35 (1976), pp.35-50 (p.40).

Da Vinci's method draws our attention to the two measurements that are needed to construct a reasonably accurate ground plan of an architectural shape: a measurement of the length of a facet (where the end points of a facet are defined by a significant change in direction) and a measurement of the direction in which a facet is facing. This method could also be used to survey many landscape features which have a defined shape; the curves of a river for instance, or shape of the circumference of a hill, valley trough, or ridge. The tools required for such a survey need not be as complex as those designed by Da Vinci. It would in essence only need a measuring rod and a compass with a number of degrees dividing the circle of its dial. The surveyor could perform a relatively accurate survey without the sighting mechanism by either standing with his back parallel to a stretch of wall or river and recording the direction in which he is facing to get a rough orientation or, in perhaps the simplest method possible, he could walk around the curve of his subject and, keeping as close as possible to its circumference, measure both the continuous distance he is walking while at the same marking each change of direction.¹¹ It is possible that Da Vinci's method, or a simplified version of it, was used by Rogers at Guines to take the distance and orientation of the existing walls and so plot out the measured drawing seen in figure 1.

Peter Barber suggests an alternative method, suggesting that the masons who first used scale in England were 'presumably familiar with Albertian principles and the basics of triangulation as transmitted by Gemma Frisius and mediated through French and German Cartographers at court.'¹² However in the absence of any evidence of contact between English masons and foreign cartographers and engineers, it is problematic to postulate that a series of complex European techniques were used to make English plats. Furthermore it is quite possible to see how these, the first scale drawings, could have been constructed very simply and almost accidentally, using a method unrelated to both the German and Italian techniques.

There is an unusual feature included in both of these drawings. Though it is only just visible on the parchment and invisible in the reproduction, figure 2 has been marked with a

¹¹ There is a surviving map that was probably made in this way. It is a scale plan, drawn in 1542, that shows an area near Calais which has recently been drained as part of the planning of a new settlement. It contains precise notes of directions beside several roads – 'est & ii pontes [points] by south' and so on. See: P.D.A Harvey, *Maps in Tudor England* (London: British Library, 1993), p.31.

¹² Peter Barber, 'Map Making in England ca.1470-1650', in *The History of Cartography: Cartography in the European Renaissance, Vol. 3, Part 2*, ed. by David Woodward (Chicago: University of Chicago Press, 2007), pp.1589-1669 (p.1607).

gold scale boundary which is the same size as the more visible black scale boundary in figure 1. In figure 2, the black scale boundary has been drawn out to be only slightly wider than the widest points of the circle of walls and at three places the walls almost touch the boundary itself. Consequently, the gold scale boundary in figure 2, which is the same size as that in figure 1, runs directly through the proposed bulwarks which extend beyond the shape of medieval walls. (See fig. 4 for a copy of figure 2 image in which the faint gold scale boundary has been emphasised to show how it runs through the proposed fortifications.)

This boundary has received some critical attention: P.D.A. Harvey notes that ‘a continuous scale bar, marked in 20-foot divisions, that almost frames the entire map’ is used in a plat of Guines and that this scale bar is ‘evidence of the need to explain the idea of the scale-drawing to the map user who would be unfamiliar with it.’¹³ Likewise, Anthony Gerbino and Stephen Johnston, no doubt following Harvey, write that ‘There are two unusual features of the plan [of Guines] that suggest that the concept of scale was new to the draughtsman or to his audience: a continuous graded ruler ringing the entire town and an inscription that records the scale in a roundabout way ‘the Inshe conteyneth L fotte.’’¹⁴ It does not seem to me to be a particularly ‘roundabout’ phrase, but the explanation of the scale bar given by these critics is clear: it was an aid to the viewer who was, in the late 1530s, likely to be unfamiliar with the basic concept of scale. However, if we accept this explanation it is distinctly odd that that the gold scale boundary awkwardly cuts through all of the new bulwarks that Rogers had designed, interrupting the proposed fortifications which it was, after all, the whole purpose of the drawings to display. It does not seem likely that the draftsmen would have drawn figure 2 and then, as an aid to a viewer unfamiliar with scale, have drawn in a scale boundary that crossed through all of the newly designed fortifications.

A more likely explanation of why the scale boundary intersects the drawing of the fortifications themselves is that John Rogers, the draftsmen of the plats, drew out both the curves of the walls and the scale boundary in figure 1 using the information gathered in a survey, and from this image traced a light outline of both curves *and* scale boundary at the same time onto a clean sheet of parchment. Then, using the shape of the walls and the scale boundary on this new page, he constructed the new bulwarks at the most effective

¹³ Harvey (1993), p.31.

¹⁴Anthony Gerbino and Stephen Johnston (2009), p.39.

positions around the existing enceinte and, preferring not to have to draw a larger scale boundary around the newly expanded works, he simply inked in the old scale boundary - the boundary he copied from figure 1 - in a bright gold which distinguished it from the newly designed bulwarks which, at many points, it interrupts.

In this explanation the scale boundary is part of the method used by the draftsman to construct, on the page, an accurate drawing of the castle at Guines and later used again by Rogers to guide his re-design of these walls. The scale boundaries are not simply an aid to the viewer, though they might have had that secondary function: they are part of the process through which the drawings themselves were constructed on the page. This analysis of the internal evidence contained within the drawings in fact suggests an answer to the question of how a survey of the real three-dimensional walls was made, for a similar full size scale boundary could also have been used as a way of measuring the full-size castle walls on the hill-top.

This possibility is not simply suggested by the fact that we see a scale boundary on the page, for the technique of measuring out a ground plan in full scale on the earth using stakes and cord had been used by master masons laying out the shape and foundations of complex cathedrals since the early twelfth century.¹⁵ John Rogers was trained as a master mason at Hampton Court and he would undoubtedly have been familiar with the technique. There is at least one record within the incomplete financial accounts of the works at Hampton Court that records the purchase of cords and stakes to measure out the new great hall in relation to the existing architectural features¹⁶ and in a letter written in 1547 Rogers describes how he has “traced and staked forth” a new design for a fortification within the existing walls of the castle of Boulogne using a rope outline on the earth.¹⁷ It is likely that Rogers and his men used cord to mark out the straight sides of a square of known dimensions around the castle.¹⁸

¹⁵ See Lon R. Shelby, ‘The Role of the Master Mason in Mediaeval English Building’, *Speculum*, Vol. 39, No.3 (July, 1964), pp.387-403 (p.401).

¹⁶ For the example from Hampton court see: H.M. Colvin, *The Kings Works Vol IV* (London, HMSO: 1983), p.135.

¹⁷ For an analysis of this letter see my conclusion below and The National Archives, MS SP 68/13, cited in Shelby (1967), p.69.

¹⁸ For the medieval and early modern use of the measured cord box see section iii of this chapter, subheading ‘The Use of the Measured Groundplan.’

The use of this box cannot be proved, but the technique was commonplace and it is a rectangle measured in feet and staked around the castle wall, it could well have provided the reference point from which Rogers drew out a small version of this measured box on the page whereby 'the Inshe conteyneth L fotte', as a description written onto the map itself states. The use of scale to relate the small and full scale boundaries in these circumstances may not have been a great conceptual leap, for a form of non-numerical scale drawing was used by master masons during the middle ages and was probably taught to Rastell during his training as a mason at Hampton Court.¹⁹

With these two proportionally related boxes corded and drawn out it would have been a relatively simple matter for Rogers to have stood up on various points around and on top of the walls and to have drawn in the curves of the walls by eye, using the box that was still corded out on the ground as a visual reference point against which to swing the curves of his lines away from the small-scale and proportionally related box on his page. It is worth remembering that there is no evidence that it is an accurate representation of the precise curvature of the walls because nothing remains of the works at Guines. There is an alternative way that the curves could have been drawn into the scale boundary that is, admittedly, less likely, but nevertheless worth mentioning. Rogers could have used the fact that at three points the walls either touch or nearly touch the box he had corded out and, returning to the site, he could have measured along his cord between (see figure 5) point A and B, C and D, and E and F. When these distances were plotted back onto his plan he would have been looking at an image like figure 6, a drawing with three accurate points from which to start drawing his curves. There would, of course, be nothing to stop Rogers using the same technique to chart out other points of the wall which run only a small (and estimable or measurable) distance away from the corded box. Possible points are shown in figure 7 and it is clear that the more points that were plotted the more likely it would have been that the drawing of the walls would have an accurate shape when the curves were inked in. There is a remote possibility that Rogers could have accurately plotted every point along the curvature of the wall at which the curve changed direction by taking co-ordinates from what essentially constitute an x and y axis.

¹⁹ Detailed explanation of this form of scale drawing is also returned to in detail in section iii of this chapter, subheading: 'The Use of the Concept of Scale in Medieval Drawing.'

I cannot prove that the drawing was constructed in this way. The use of the corded box and the simpler variant whereby Roger sketched in the curves of the walls from various vantage points does however seem a reasonable explanation of why the scale boundary appears on this drawing and how, if not as an aid to the viewer, it was used. It is possible that English scale drawing in sixteenth century paper maps and plans was first developed by Rogers at Guines at the point at which Rogers decided to relate the length of the visual guide-lines on his page to the corded lines on the earth. The greatest strength of this argument is its simplicity, for what we see in the construction process around the Guines images is a form of scale drawing that does not require any new tools, neither the compass, nor the technique for using a compass that Da Vinci describes.²⁰ Neither does it require Rogers to have worked out the relatively complex method that Da Vinci uses to survey an irregular feature, because within the process that I have described, no initial survey of the irregular shape of the actual feature need ever actually be made. The concept of scale – in which the linear distances on the earth relate in fixed proportion to lines on the page – is introduced through the proportional relationship between two sets of *straight* lines that the draftsman draws himself: one set marked out on the earth, one set drawn on the page. With these two straight-edged measured boxes in place the actual feature is simply sketched into the small rectangle on the page.

This analysis suggests that in the drawings of Guines we see a proto-form of scale that develops the basic concept of a scale relationship between page and subject. This early technique will only later develop into the modern form of scale drawing which takes a measured survey of the subject itself. For there is a progression between the first stage exemplified at Guines, where a rectangular space on the earth is drawn out that relates in fixed proportions to a rectangular space on the page and sketching or, perhaps, plotting within this carefully measured page space a shape that in-turn will relate to the full size feature in a fixed ratio. Then in the second stage, methods of surveying and gathering the kinds of information Leonardo collects are worked out: information that will allow the

²⁰ On the tools that were used in the medieval building trade, see: Lon Shelby, 'Master Mason's tools: The level and the Plumb Rule', *Technology and Culture*, Vol. 2, No. 2 (Spring, 1961), p.127-130; Lon Shelby, 'Master Mason's Tools II: The Compass and the Square', *Technology and Culture*, Vol. 6, No. 2 (Spring, 1965), p.236-248.

draftsman to record the curves of abstract shapes directly onto the page and does not involve the draftsman sketching in the parts of those shapes by eye.

More broadly, the analysis of the Guines drawings breaks down the process of scale drawing into three constituent elements, technical and conceptual skills whose history in the architectural work of the Middle Ages can now be traced:

1. The use of the measured, cord box as a method for planning and measuring a building at a preliminary stage.
2. The use of the concept of scale, wherein objects on the page relate in a fixed ratio to objects in the real world.
3. The use of a set of drawing conventions that allow the accurate drafting of a proposed work on the page.

The last strand is perhaps the least obvious in the above analysis of the Guines images but it is the most important, for beyond the decision to measure out the existing walls and work out the numerical scale, Rogers' familiarity with the plan view, a form of projection that is able to represent the walls on the page without the distortions created by perspective, is a central part of making an accurate scale representation.

This chapter now turns to look at the history of architectural drawing in the Middle Ages before focusing on various aspects of medieval design practice in order to trace the origins of the three concepts and techniques that have been identified above. My aim is to show how sixteenth century plats develop out of the technical idiom used by master masons in the working drawings of the Middle Ages and to begin to surround these sixteenth century plats with a contextual background within an intellectual and craft tradition. With an explanation of the technical construction of these plats in place it is then possible to see how these plats emerge out of a social interaction between Henry and his craftsmen.

ii. The History of Architectural Drawing in the Middle Ages.

The medieval working drawings made on earth, plaster and stone surfaces are so specialized that they can easily seem to constitute an academic subject or genre of image unto themselves and they have been largely ignored or disregarded by map historians.²¹ They are drawn at three stages in the construction process. The first type of working drawing was the groundplan of a site, which was constructed at full scale on the surface of the earth using ropes, string and brightly coloured powder like lime. The second type of working drawing was the full scale representation of the parts of a building that required complex stones to be carved, often window tracery or roof vaulting. These drawings were made on the tracing floor in semi-permanent material like chalk, or scored into its thin plaster surface (so that the drawings could be erased with a thin skim of plaster), or incised directly into the stonework of any available wall or floor large enough to contain the full-scale representation. The full scale image on the floor or wall would have been transferred from the surface onto wooden boards and then cut into sections, each of which would have had a profile that corresponded to a single stone within the total web of the stonework. These templates constitute a third type of architectural drawing. The wooden templates were distributed to masons in the stoneyard and were used as blueprints of the size and shape of individual stones.

The following explanation of the different types of technical representation used by masons in the Middle Ages attempts to address this lacuna. It looks in more detail at each of the three types of technical image without focusing on their influence over the sixteenth century paper drawings made by master masons, a comparison which is left to part three of this chapter. In order to understand the later comparison a basic understanding of the use of drawing in the process of medieval architectural design and construction is pre-requisite. As I have suggested, the full-scale drawings of the Middle Ages have been largely neglected by map historians and this may, in part, be due to a reluctance to engage too deeply with the complex and detailed architectural history which needs to be understood before the these

²¹See esp. R.A Skelton and P.D.A Harvey, *Local Maps and Plans from Medieval England* (Oxford: Clarendon Press, 1986), p.6-18; Peter Barber, 'England I: Pageantry, Defense and Government: Maps at Court to 1550', in *Monarchs, Ministers and Maps*, ed. by David Buisseret (Chicago : Newberry Library, 1985), pp.26-57 (p.1595); P.D.A Harvey, 'The Portsmouth Map of 1545 and the Introduction of Scale Maps into England', in *Hampshire Studies*, ed. by John Webb, Nigel Yates, and Sarah E. Peacock (Portsmouth: Portsmouth City Records Office, 1981), pp.33-49. (p.38); P.D.A. Harvey, *Maps in Tudor England* (London: British Library, 1993), p.95-96.

drawings can be appreciated. However, this architectural history is of fundamental importance for sixteenth century map making because the drawing skills and techniques used to construct full scale drawings made on earth, plaster and stone continue to be taught to masons and map-makers like Rogers, Lee, Clement and Dickenson well into the sixteenth century²² and these medieval techniques constituted the basic graphic training of these men.

With this contextual history in place, it is then possible to focus more closely on precise aspects of medieval architectural drawing and design practices and identify the origins of the kinds of material and conceptual skills which were used in the paper plats of the 1530s and 1540s.

The groundplan

Laying out a proposed groundplan at full-scale on the earth using rope and lime to mark the boundaries of the building as well as to indicate foundation lines for interior walls and pillars was probably the graphic technique with which most medieval building projects began.²³ In 1547 Rogers described having “traced or staked forth a little castle” using rope or string,²⁴ and while such groundplans would clearly be destroyed by the building itself, in the fifteenth and sixteenth centuries there is some documentary evidence for purchase of the materials with which they were constructed. The day books from Hampton Court, for example, record that when the King’s great watching chamber was extended, ranging line was bought to lay out the new foundations.²⁵ Similarly, in one of the few full works accounts to survive from Henry’s 1539 fortification project there is a record of the purchase of new line “of lxxx fadam and x for to mete [measure] the wall of the Castell”²⁶ and there is

²² On Rogers training as a mason see the introduction to Chapter two. On the history of Lee, Clement and Dickenson see: J.H. Harvey, *English Mediaeval Architects : a Biographical Dictionary down to 1550* (Gloucester: Sutton, 1984).

²³ See Lon R. Shelby ‘The Role of the Master Mason in Mediaeval English Building’, *Speculum*, Vol. 39, No.3 (July, 1964), pp.387-403 (p.401). Medieval manuscripts often show medieval architects who are often shown holding an oversized pair of compasses suitable for the work. Salzman (1952), p.16, discusses the use of full size tools. Coldstream (1991) contains multiple images of medieval manuscripts showing masons with full size tools.

²⁴ For a reproduction of the letter see The National Archives, MS SP 68/13, cited in L.R. Shelby (1967), p.69.

²⁵ H.M. Colvin, (1982), p.135.

²⁶ Cited in H.M. Colvin (1982), p.576.

evidence of the purchase of a similar set of materials with a description of their use in the accounts of building works at Eton college in 1447 which states that ropes, cords, firpoles and lime were bought to measure out the foundations of a building.²⁷

Despite the fact that medieval groundplans were made using semi-permanent materials on the earth and were always destroyed as part of the building process, critical work on their use is the subject of extensive contemporary work.²⁸ Architectural historians tend to take it for granted that full-scale groundplans were used to actively design medieval cathedrals at full-scale on the earth (without the use of intermediary drawings²⁹) and contemporary critical work is largely concerned with analysing medieval buildings to uncover how the groundplan was generated.³⁰

The term used by contemporary critics to describe the process of medieval design is “constructive geometry”, a catch-all phrase that refers to a number of medieval design processes which all share a common method: a way of generating lengths and shapes through the physical manipulation of geometric shapes and without the use of numerical calculation.³¹ Constructive geometry has been used to explain the design process behind many features of medieval architecture, including the method through which the patterns of window tracery and roof vaulting were generated, but it was also used to design and lay out the groundplan of the whole cathedral or church. In simple terms, the process imagined by

²⁷ “*diuersis cordis et filis voc’ paklynes whitelynes provisio pro mensuracione fundamenti diciti collegii*,” cited in Robert Willis and J.W. Clark, *The Architectural History of the University of Cambridge I*, (Cambridge, 1886), pp.396, n.2; see also Douglas Knoop and G.P. Jones, ‘Laying the Groundwork’, *Miscellanea Latomorum*, New Series, XXII (1937), pp.29-31.

²⁸ See, for example, the collection of essays concerning the use of groundplans at various English and continental sites contained in: *Ad Quadratum, the Practicle Application of Geometry in Medieval Architecture*, ed. by Nancy Wu (Aldershot: Ashgate, 2002). See also: Eric Fernie, ‘The Groundplan of Norwich and the Square Root of Two’, in *The Engineering of Medieval Cathedrals*, ed. by Lynn Courteney (Aldershot: Ashgate Variorum, 1997); John Maddison, *Ely Cathedral: Meaning and Design* (Ely: Ely Cathedral Publications, 2000); Jerry Sampson, *Wells Cathedral West Front: Construction, Sculpture and Conservation* (Stroud: Sutton, 1998).

²⁹ See: Pacey (2007), p.64, who writes, “There were systematic procedures for staking out the plan of a new building on the site and the layout of stakes, pegs and cords on the ground would constitute a full-size drawing that could be discussed and modified before the foundations were dug. In that sense, the process modern designers go through when they draw a plan and discuss it with those commissioning the building could be followed even without a drawing on parchment. The difference was that this would all be done on site and revisions to plans would entail moving stakes and cords on the ground, not erasing lines on a drawing.”

³⁰ See: Wu (2002) for a number of studies working back from the stone structures of existing cathedrals to work out how groundplans were manipulated during the design process.

³¹ On constructive geometry see: Lon Shelby, ‘The Geometrical knowledge of the Medieval Master Masons’, *Speculum*, Vol. 47, No. 3 (July, 1972), pp.395-421; *Gothic Design Techniques: The Fifteenth-Century Design Booklets of Mathes Roriczer and Hanns Schmuttermayer*, ed. by Lon Shelby (Carbondale: Southern Illinois U.P., 1977); Stephen Victor, ‘Practical geometry in the High Middle ages’ (Unpublished Phd thesis, Harvard, 1973); Paul Kidson, ‘Systems of Measurement and Proportion’ (Unpublished Phd. Thesis, Courtauld Institute, 1956).

architectural historians is of a large square being staked out on the earth using stakes and string and the diagonal of this square being measured non-numerically by stretching a length of cord between two corners. In numerical terms the length of the diagonal will be in a root two proportional relationship to the length of the side of the square, and this length was used as a dimension for a related architectural feature. It could also be used as the side of a new square which could itself be subdivided to give further proportional dimensions and, through a repeated rotation and subdivision, could generate a series of ever decreasing and proportionally interrelated lengths. Root two proportional relationships have been found to structure the proportions of many medieval cathedrals. In the design plan of Ely Cathedral, for example, modern measurement of the building shows that the various parts of the church are related in a series of proportional relationships: the main vessel of the building is twice the width of the aisle, which is root 2 the width of the aisle responds which is in turn root 2 times the depth of the piers and root 2 times the width of the arcade wall.³² As the measurements of Ely suggest, dimensions in medieval architecture are often based around irrational numbers and constructive geometry enabled these dimensions to be generated non-numerically, using the subdivision of the square.³³

Within architectural history critics continue to measure and analyse cathedrals in order to uncover the precise series of geometrical steps through which shapes laid out at full scale were manipulated and subdivided in order to create the groundplan that designed the work.¹³⁴ However, for the purposes of map history, the details of these calculations are less relevant than the general point that architectural historians have shown that medieval builders developed a way of designing a building without the use of small-scale paper plans. As this chapter will come to show, medieval builders may have used graphic and technical skills taught to Rogers in the sixteenth century but during the medieval period there was no reason to combine these skills to make small scale plans. The full scale method enabled the

³²Coldstream (1991), p.39.

³³See Coldstream (1991), p.34. Coldstream writes that “The commonest dimensions in medieval architecture were generated either from the diagonal of half a square, which is the Golden Section, or from the diagonal of a complete square; where the square stands to the baseline of the new rectangle in a proportion of one to the root of two.” For a detailed account of the design of Ely Cathedral see: John Maddison, *Ely Cathedral: Meaning and Design* (Ely: Ely Cathedral Publications, 2000).

³⁴ In his introduction to a series of case studies of some of the major European cathedrals, Eric Fernie outlines the many difficulties faced by historians trying to re-construct these design systems. See: Eric Fernie ‘Introduction’, in *Ad Quadratum, the Practicle Application of Geometry in Medieval Architecture*, ed. by Nancy Wu (Aldershot: Ashgate, 2002), p.1-11.

builder to generate both the design of the whole building and mark the site for the fortification to be dug without the use of small scale plans of the kind that would later be made in order to communicate design ideas to patrons.

Had any groundplans, or any written descriptions of groundplans survived it may have been possible to compare the medieval full-scale drawing conventions to Rogers' own small scale drawings of the castle of Guines in the 1540s. This comparison would probably have been valuable in so far as one would be comparing one form of groundplan with another. In the absence of any such material, Rogers, drawings are set against the medieval drawings of parts of the building, full-size drawings of which have survived on walls and floors.

However, we can gather some idea of how the medieval groundplan and its drawing conventions may have held a strong influence over the paper groundplans of the sixteenth century. As chapter three will suggest in a discussion of Rogers' plats, it is likely that the standardised conventions for portraying doorways and stairways that appear in on-paper groundplans made at different sites by different draftsmen from 1534 onwards are quite so consistent because the draftsmen have all been taught a shared set of masonic drawing conventions developed through the full-scale groundplans of the Middle Ages.

The use of full scale drawings of parts of a building

Full-scale drawings of complex sections of stonework within the superstructure of a building - typically sections like the windows and roof vaults - have a long history in England. The first surviving tracing floors were used to lay out full-scale drawings of parts of a building in the late twelfth or early thirteenth century and have been found at the abbeys at Byland and Gisborough, and convincingly hypothesized at Durham cathedral; they have been described in a recent series of articles.³⁵ At most sites where drawings have been found there is a single set of drawings which relates to the initial construction of the building,³⁶ but

³⁵ On Byland see: Stuart Harrison and Paul Barker, 'Byland Abbey, North Yorkshire: The West Front and Rose Window Re-constructed', *Journal of the British Archaeological Association*, Vol. 140, No.1 (1987), pp. 134-151; on Durham see: Jean Bony, 'The Stonework Planning of the First Durham Master', in *The Engineering of Medieval Cathedrals*, ed. by Lynn Courteney (Aldershot: Ashgate Variorum, 1997), pp.19-34; on Gisborough see: D.A., Heslop, 'Excavations within the Church at the Augustinian Priory of Gisborough Cleveland', *Yorkshire Archaeological Journal*, 67 (1995), pp.51-125.

³⁶For designs at Ely see: John Madison, *Ely Cathedral: Design and Meaning* (Ely: Ely Cathedral Publications, 2000); At Christchurch Priory, Hampshire see: John Crook, 'New Light on the History of St Mary's Church, Old Basing, Hampshire: An Incised Design', *Journal of the British Archaeological Association*, 154 (2004),

at a large cathedral like York the tracing floor records designs constructed from the 1290s through to 1525³⁷ and while late drawings are rare, evidence of full scale drawing extends well into the sixteenth century and is used to design domestic and ecclesiastical sites.³⁸ As Arnold Pacey suggests, the paper architectural drawings of the sixteenth century were of real practical value, but they were neither accurate enough nor sufficiently detailed for builders to rely on them entirely. Pacey cites a number of examples including those made on the York tracing floor in 1525, and on the walls of Acton Court, a private house in Gloucestershire built in 1550s, to argue that it was still usual to make full-size drawings where it was important to get detailed stonework right.³⁹

Many of the technical drawings that were made in the Middle Ages were drawn out in tracing houses, two of which survive, at York and Wells. Tracing houses seem to have been the medieval equivalent of modern design studios, that is, spaces purpose-built to house the unusual demands of design work which, in the Middle Ages, required a very large flat surface to contain the full-scale drawings of features like the ribs of roof vaults and window tracery. The surviving tracing houses at York and Wells are essentially roofed structures designed to cover a large floor spaces that are, to this day, covered in medieval design drawings that have been incised into the plaster surface.⁴⁰ These tracing floors are made up of multiple thin layers of plaster, and it is thought that the whole floor was re-surfaced with a thin wash when a blank drawing space was needed. Tracing floors were built throughout the Middle Ages. For example, a 'trasour' is mentioned at Windsor in 1351 and 1397 and at Ely in 1360, there is a 'trasyng hous' recorded in the accounts of the construction of Exeter Cathedral in 1374 and the 'tracery house' at Westminster is mentioned as late as 1532. There is similarly late evidence of the north transept of Vale Royal Abbey in Cheshire being used as a tracing house in 1539.⁴¹ Tracing houses were not the only places that full-scale

pp.92-132 (p.127-9); for the most recent work on St Mary's Church, Ashwell, see: David Sherlock, *Medieval Drawings and Writings in Ashwell Church, Hertfordshire* (Ashwell: Ashwell Parish Church, 1978).

³⁷See Alexander Holton, 'The Working Space of the Medieval Master Mason: The Tracing Houses of York Minster and Wells Cathedral' in *Proceedings of the Second International Congress on Construction History Volume II*, (2006), p1579-1597; Sarah Brown, 'Our Magnificent Fabrick' *York minster: An Architectural History. C.1220 - 1500* (Swindon: English Heritage, 2003), esp. p.66-71.

³⁸On work at the church of St Mary's, Basing made c.1550 see Crook (2004). On domestic architecture and its use of full scale design see: Kirsty Rodwell and Robert Bell, *Acton Court, The Evolution of an Early Tudor Courtier's House* (London: English Heritage, 2004), esp. p.271-5.

³⁹ Pacey (2007), p.167.

⁴⁰ For more information see: Holton (2006).

⁴¹For an exhaustive survey of the documentary evidence of the types of architectural drawing discussed above see Salzman (1952), p.18-22. On Vale Royal Abbey in Cheshire see H. M. Colvin (1963), p.254.

drawings were made, and at many sites full-scale work was made on any convenient flat surface, as at the example of Byland discussed below, where a drawing of the central roundel of the rose window was made on the wall directly below the window at ground level.⁴²

The tracing floor was used to lay out a full scale drawing of an architectural feature, in the vast majority of surviving cases, of window tracery. As the evidence from the works at Byland show, the drawn image of the work at full-size was then divided up at points where the joints between stones could most efficiently be placed.⁴³ When divided up in this way, what looks like a drawing of the whole actually then contains what are, essentially, a number of full size design drawings, each of which models the profile of a single stone. These single-stone design drawings were copied off the tracing floor onto wooden boards and given as working drawings to the masons in the stone yard who each worked to carve one piece of the window. (See Coldstream (1991) for MS illustrations of the stoneyard and the cutting and placement of the single blocks of stone). When put back together these stones will, of course make a complete window. Unlike in modern building where much of the effort in construction takes place in guiding the combinations of fluid concrete and steel as the building is being put together, in masonry work, the large proportion of the construction work is done in the stoneyard as the stones are shaped. Finding a way of controlling the work in the stoneyard is effectively the way in which a master mason was able to construct his design. The tracing floor enables a transition of the concept of, for example, a rose window, from the mind of the mason into a full scale image, and then, most importantly, allows the mason to create a series of design drawings for each individual stone by jointing this image at the correct points and transferring these sections onto movable boards. The tracing floor is a piece of technology which enables a transition from designing the whole to creating design drawings or templates for the parts, parts which when recombined will in actuality make the whole window.

The template

⁴² Harrison and Barker (1987), p.142

⁴³See: Harrison and Barker (1987), p.142-44; also my extensive analysis of their work in Chapter one, section iii.

As the above explanation suggests, templates were wooden boards used as full-scale plans by the masons in the yard to shape rough-hewn stone into the correct three dimensional shape. Templates are used by modern masons to this day (figs 8 and 9 show some modern examples of templates, and a picture of similar templates seen in the background of a sixteenth century painting). While many stones, those used in the construction of large plain section of wall for example, would have been carved using standardised templates, in the case of more complex or one-off stones, like the angled stone used at the base of an arch, the profiles of templates were taken from the shapes drawn out on a tracing floor. The following passage is taken from a sixteenth century account of the building of Roslyn Chapel, Midlothian, by the Earl of Orkney in 1446, and describes how templates were used as a way of designing the specialist features of a work:

The fundation of this rare worke he causd to be laid in the year of our Lord 1446. And to the end the worke might be more rare, first he causd the draughts to be drawn upon Eastland boords, and made the carpenters to carve them, according to the draughts thereon, and then gave them for patterns to the masons, that they might therby cut the like in stone..."⁴⁴

This passage expresses the point that complex or "rare" work was worked out through the use of templates, and that the design drawings made onto boards by the designer were given first to the carpenters who cut the drawn shapes out of the boards and then passed on to the masons in the stone yard, where they acted as rigid and resistant design drawings that could be re-used throughout construction as patterns to carve the stones themselves. No templates survive from the Middle Ages but there is extensive documentary evidence supporting their use. The first account of their production is in the chronicle of Gervase of Canterbury from which we learn that in 1174 William of Sens was appointed architect in control of the rebuilding of Canterbury Cathedral. Gervase makes particular mention of the fact that on commencing the works William 'delivered to the carvers who had come

⁴⁴John Britton, *The Architectural Antiquities of Great Britain*, Vol. 3 (London, 1835), p.61, quoting a MS in the Richard Augustin Hay's collections in the Advocate Library, Edinburgh, cited in: Lon Shelby 'Medieval Masons' Templates', *Journal of the Society of Architectural Historians*, Vol. 30, No. 2 (May, 1971), pp.140-154 (p.143).

together the moulds (formas) for shaping the stones.’⁴⁵The early word for templates, *formas* is here used and it is normally translated as a mold, rather than a template but the words “mold,” “*formas*” and “template” all refer to the same wooden pattern. The numerous references to the use of molds throughout the Middle Ages were exhaustively collated by Salzman in his 1952 history of English building. The majority of references are found in the financial accounts of the works site and they record the purchase of material for the templates themselves. For example, at Woodstock in 1255 four and a half pence was paid ‘for boards for making moulds.’ At the Tower of London in 1282 Stephen Joignur was paid ‘for various planks (tabulas) for molds for the work of the masons.’ Boards were also bought for making molds at Ely in 1323, at Langley in 1372 ‘2 sawn ryngoldbord bought to make moldes for the masons’ and in 1350 there is a record that 16 masons were ‘shaping and working stones according to moulds given to them by John Leycestre’ the chief mason at the Tower. This practice continued into the sixteenth century and in 1540 the word “template” is used for the first time in the works at Calais, where white boards were bought for making ‘templattes and plumrules.’ Elsewhere in the same accounts, ‘weynskottes’ or oaken boards were purchased ‘for to make moldes, setting reuelles and squares.’⁴⁶

The Gervase account of how William of Sens began the cathedral at Canterbury by delivering, ‘to the carvers who had come together the moulds (formas) for shaping the stones’ is of particular interest because it emphasizes the point that templates were fundamentally design drawings. Though each template may only have related to a very small part of the whole, making design drawings of single blocks of stone was a central part of the master mason’s role as designer, for the stones made from these drawings, when recombined, made up the superstructure of the building. We see a similar example in the account of the construction of St Stephen’s Chapel in Westminster Palace. The financial accounts and payroll of the site record that in 1331, when work resumed on the chapel after several years delay, the master mason, Thomas Canterbury, returned to the site three weeks before any other masons. During this time, he was engaged “in trasura super moldas operanti” that is, working on the molds or templates in the tracing house.⁴⁷ We can infer that during this time he was laying out full-scale working drawings on the floor of the

⁴⁵ Salzman (1952), p.370.

⁴⁶See Salzman *Building in England* (1952), p.19-22, for further examples and a more detailed commentary on these references.

⁴⁷Shelby (1971), p.141.

“trasura” and using these full scale drawings to make up the templates used to begin carving the first stones. Along with the laying out of the groundplan, it is during this period of solo work in the tracing house that we can locate the process of medieval design. It is in this system of design drawing that John Rogers trained, for as we know from the financial accounts of Hampton Court he was regularly, if not continuously, paid for work between October 1533 and August 1537, carving under contract both specialist stones like those that surrounded the doors and fireplaces of the “Kynges great watchyng chambre” and the more routine work produced in the masons lodge and made using a set of standardised templates.⁴⁸

The above explanation of medieval architectural drawing has been extracted part by part from an extensive array of architectural sources.⁴⁹ The history of Romanesque and Gothic architecture has been studied in an imposing body of work, and the texts of use to a map historian apply a number of different methodologies to further a disparate range of interests and arguments. Despite the fact that recent architectural scholarship is becoming more interested in the material processes through which buildings were designed, architectural history has not traditionally approached its subject through the types of drawing that were used to design and construct medieval buildings.⁵⁰ Architectural history has understandably focused on the full range of subjects that help to examine all kinds of medieval architecture and, until recently, the process of constructing design drawings constituted only a very small part of this study. For a map historian, the drawings made at a design stage are an important subject in their own right, and as a limiting principle I would suggest that the focus of the map historian ought to be the ways in which drawings were constructed and modified in order to be able to communicate and manage the construction

⁴⁸ See the opening of chapter two for a detailed discussion of Roger’s early career.

⁴⁹ Many of these works are cited above, but for a good introduction to medieval architecture with extensive suggestions for further reading see: Nicola Coldstream, *Medieval Architecture* (Oxford: Oxford University Press, 2002).

⁵⁰ The most recent example of this trend is Gerbino and Johnston (2009), esp. p.11-13. Older histories concerned with the structural engineering of medieval cathedrals or the building processes behind their construction include: Jacques Heyman, *The Stone Skeleton: Structural Engineering of Masonry Architecture* (Cambridge: Cambridge University Press, 1995); R. Mark, *Architectural Technology up to the Scientific Revolution; The Art and Structure of Large Scale Buildings* (Cambridge, Mass.; London: MIT Press, 1993); Gunther Binding, *Medieval Building Techniques*, trans. by Alex Cameron (Stroud: Tempus, 2004).

process. This aspect of medieval architecture has not been treated as its own coherent subject, but for a history of the map in the sixteenth century it is of central importance because the drawings and the drawing techniques developed in the Middle Ages continue to be taught into the sixteenth century. Furthermore, as my introduction suggests, following Harley and Woodward's work on re-defining what constitutes a map, these drawings could be re-situated within a history of cartography that focuses on them directly.

The above explanation of the role of drawing in medieval architecture suggests that medieval masons used full-scale drawings of the whole and of parts of a building within a system which developed in light of the precise and unusual demands of constructing buildings with stone blocks. The implication of this argument is that in the vast majority of the works constructed during the medieval period, there was no need for small on-paper scale images, or semi-scale images of the total works because masons developed a whole system of design drawings based on full-scale work which was deeply and fundamentally integrated into the actual processes through which buildings were made.⁵¹ However, despite the fact that small-scale drawings as we understand them were not used by masons, in the following section this study moves on to look more closely at the types of image that *were* used as part of the design and construction process in the Middle Ages and argues that all the material techniques and graphic skills used at Guines in order to construct the first scale drawing *can* be found as part of the routine design practices of the Middle Ages. This thesis will return to the implications of this argument in chapter three, where I will argue that under the pressures exerted by Henry VIII in the 1530s and 1540s masons are forced to use these old craft skills in new ways and that this new combination of skills produces a set of small scale images on paper, of which the Guines drawings are only single examples.

Understanding how the techniques used at Guines originate in the medieval drawing practices is a useful case study for how the medieval skills re-emerge in the sixteenth century plats. Part i of this chapter ended with a discussion of the three material and conceptual skills that were used in the construction of Guines: firstly, the use of a set of drawing conventions that allow the accurate drafting of a proposed work on the page; secondly, the use of the measured, cord box as a method for planning and measuring a

⁵¹ The caveat to this point is discussed in chapter two, for semi-scale images do begin to be made in the 1400s but they are made as part of a contractual agreement with patrons made at the start of the works and they are neither drawn to scale, nor used as part of the construction process.

building at a preliminary stage and thirdly, the use of the concept of scale, wherein objects on the page relate in a fixed ratio to objects in the real world.

I have suggested that even a basic understanding of medieval drawing involves a grasp of the context in which it was used, and with a more general history of the forms of medieval drawing in place this chapter now moves on to look at where and how the concepts and techniques used in 1540 originated in the design practice of medieval masons. I start with by far the longest and most contextually involved of these points, the history of the drawing conventions, before looking at the use of the measured plan and the origins of the concept of scale.

iii. Finding the Origins of Sixteenth Century Mapping Techniques in Medieval Architectural Drawing.

The history of sixteenth century drawing conventions

This history of the drawing conventions used at Guines can be traced right back to the first example of a tracing floor found in England, that of Byland Abbey. The history of the tracing floor at Byland Abbey relies on the work of Stuart Harrison and Paul Barker, who, through extensive photogrammetric survey of the ruined abbey and archaeological excavation of the site, have been able to gather enough of the scattered stone fragments of the rose window to reconstruct an image of the rose window's structural features. The content of the following argument necessarily draws heavily on their work.⁵² The evidence concerning the tracing floor at Byland Abbey is particularly important because the abbey is thought to have been complete by the early 1190s, which makes it considerably older than the complete tracing floor which survives at York Cathedral.⁵³ The report of the excavations made in 1930 writes of a slab that was found in the warming house but which came from the fallen floor of the room above, and the report assumes that the stone was a single piece of a stone tracing floor that was situated above the warming house and was used, in the late 1100s, to

⁵² Stuart Harrison and Paul Barker, 'Byland Abbey, North Yorkshire: The West Front and Rose Window Reconstructed', *Journal of the British Archaeological Association*, Vol. 140, No.1 (1987), pp.134-151.

⁵³ The more intricate rose windows at Kirkstall Abbey, and Fountains Abbey have been dated to c. 1155-60 and they were presumably designed using a similar type of technical drawing, but no evidence of this tracing floor survives. See Harrison and Barker (1987) p.149.

draw out a full-scale design for the rose window at Byland. Unfortunately, the remaining piece of the tracing floor has actually been lost and the principle record of it survives in the notes of John Bilson, who made an annotated drawing of the slab which is reproduced in figure 10. The slab is inscribed with two concentric circles (see fig. 10, lines a and b). Standing on the rim of the outer circle is the outline of a moulded base and part of the shaft which it carried (c) with, to its left, traces of a second base (d); within the inner circle was inscribed the arc of a smaller circle (e).⁵⁴ From Harrison and Barker's reconstruction of the window tracery we can see what part of the window was drawn on the stone and its position is marked in bold on figure 11 and labelled "a." From the drawing on this piece of the tracing floor it seems reasonable to assume that an image similar to the outline seen in figure 11 would once have been laid out in full in an outhouse of the abbey.

This full-size image on the tracing floor was divided at points where the joints between stones could most efficiently be placed. These divisions create what are essentially many hundreds of individual design drawings each of which was copied onto a template and gave a mason working in the stoneyard a profile with which to shape their work on individual blocks.⁵⁵ We can quite literally see how a full scale image was divided up into a series of small design drawings at Byland, for while the complete tracing floor has not survived, a full scale drawing of a detail of the rose window tracery that was incised into the stonework on an interior face of the Abbey still survives. The detail which was drawn out is a ring of six stones which together made up the central circle of the window. It is emphasised and marked "b" in figure 11, its location on the wall is shown in figure 12, and a photo of the drawing in the stonework itself, in which the incised lines have been emphasised with chalk, is seen in figure 13.

The drawing has been weathered over the past 800 years but it clearly shows how the shape of the central ring was divided up to give six identical design drawings of the

⁵⁴ Harrison and Barker, (1987) p.142.

⁵⁵ There is some evidence that in simpler constructions stones were laid directly onto the lines of the incised drawing, marked out, and cut to shape. This possibility was raised by the discovery of a window at the Temple Church in London which was uncovered during nineteenth century. The architect who found the window saw lines scratched on the stones of the outer rim of the wheel which seemed to imply that they had been laid out on top of a drawing, and the curved lines of the tracing transferred straight to the stone blocks. Yet the evidence for this practice concerns a simple round window with eight spokes, and it would probably have been inefficient for the many parts of the rose window at Byland, where the use of wooden templates(as discussed above) would have enabled masons working in the stone yard to carve the shape of a number of stones to be cut at once, without constant reference to the tracing floor. See David Lewer and Robert Dark, *The Temple Church in London* (London: London Historical Publications, 1997), p.124.

single stones. One of the stones actually carved with, presumably, reference to this drawing has been found. It is photographed in figure 14 and matches the inscribed drawing exactly, being one sixth of the feature planned out. Harrison and Barker suggest that the drawing might have been used to check the size of these stones before they were hauled up to the window itself, the assumption being that, as can be seen in fig. 12, the drawing has been constructed directly below the window at the point where scaffolding used to move these stones into position would have to have been placed.

The drawing on the tracing floor was used as a way of generating a set of templates which would guide the carving of the individual stones, but it was also probably used as a prototype to model the strengths and weaknesses of a new design concept at a preliminary stage. Evidence at Byland is limited, but at York and Wells the topmost surface of the tracing floor contains many unused designs and countless others must have been tried and erased by the thin skims of plaster which lie under the top surface. At Byland the rose window seems to have been an adaptation of an existing design. As Harrison and Barker suggest, the techniques of the Byland craftsman are relatively simple:

Confronted with the problem of building a window of radiating spoke and arch design, he adapted the methods used in the construction of cloister arcading and, by altering the angles of the voussoir faces and the angle at which the arches sat upon the capitals, produced arcading of radiating form.⁵⁶

Harrison and Barker suggest that the draftsman's approach to constructing a circular window was to adapt the column and arch arcading familiar from the covered walks in monastic and collegiate cloisters and that the primary function of the drawings was to work out how far the jointed surfaces that would be horizontal in a linear arcade would have to be angled so the arcading could be sent round in a circle. The drawing at Byland was, in other words, made to generate the construction details of the window. In contrast to the relatively simple design of the Byland window, the reconstruction of the rose window at Kirkstall Abbey, which was built in the 1150s, shows that it used an intricate arrangement of intersecting arcs to form an interlacing design, and a similarly dated rose window at

⁵⁶ Harrison and Barker (1987), p.148.

Fountains Abbey used a similar system of interlocking joints.⁵⁷ It is probable that these more complex works were also designed on a tracing floor. The tracing floor was part of a new technology that gives these craftsmen a whole new way to explore ideas, for with the advent of the plaster tracing floor masons were able to model new ideas rapidly on an semi-permanent surface, and, moreover, the full size image enables craftsmen to work out a set of wooden templates which guide the carving of the stones from which the real three-dimensional window was made. These drawings were a method of prototype modeling, a way of generating the construction details of the window, and a central part of the process of actually having the window itself made.

The drawings made on the tracing floor are being used in a way that is unusual in the Middle Ages. For the incised images give visual priority to the physical dimensions of their subject, indeed, the lines of the images function solely as guides to the lengths and angulation of the surfaces they represent in two dimensions. Unlike the vast majority of medieval drawings, the drawings on tracing floors are not concerned with replicating either the actual appearance or the moral or symbolic value of their subject. Their intention is not to portray their subject as if it were seen from a particular perspective position or to offer a moral or symbolic interpretation. They are, in effect, graphic abstractions in which the vast majority of a subject's materiality is cut away to leave a specific type of line, one which replicates not mimetically, but by following the outer boundaries of a subject, tracing only its physical proportions.

We will come to look in more detail at some of the technical drawings produced on tracing floors in between 1190 and 1530, but my argument is that Rogers will use the same type of technical line we see at Byland over three hundred years later at Guines. To understand in what sense both the Byland tracing floor and the Rogers drawing use a similar mode of graphic abstraction it is helpful to return to the drawing of Guines, and to contrast it with a drawing of Hull made by Rogers soon after his work there⁵⁸. The plat of Hull's waterways provides an almost unique contrast with the Guines images because it represents its subject in a confused and confusing way, and the consequent complexity enables us to foreground how the drawings from Guines and Byland represent their subject.

The following extract is a rare example of a letter written from Guines which actually talks about the plats produced on-site. While it is not certain that they discuss the Guines

⁵⁷ Harrison and Barker (1987), p.148.

images which are analysed in part A of this chapter, it seems likely given the history of the works laid out by Lon Shelby.⁵⁸ In the spring of 1541 Henry VIII sent the Earl of Southampton and John Lord Russell on an inspection tour of the French fortifications. On the 8 May they wrote to the King,

We arrived here [yesterday after]noon and incontinent saw your plats w[hich your] mason brought hither, and that done that day we viewed afull your castle as you re[quested.] And this morning and afternoon we have eftsoons viewed the same again, considering t[he] said your plats and them together, and to [be] plain with your grace, by the faith, duty, [and] allegiance which we bear unto your Majesty, that had you and six of the wisest men within [the] realm had been here a fortnight together, y[ou] could have devised your plats no better th[an they] have done. And as far as our wits can compass, we cannot invent or find [...] how conveniently to add or to d[etract any]thing.⁵⁹

From this report we can infer that Southampton and Russell were sent by Henry to compare the castle and the drawings and assess whether the drawings were accurate. So high was their commendation of the plats to the king that they wrote that had “you and six of the wisest men within [the] realm [...] been here a fortnight together, y[ou] could have devised your plats no better.” The two men go further than this, writing that “we cannot invent or find [...] how conveniently to add or to d[etract any]thing.” Southampton and Russell suggest that nothing external, nothing that one could “invent” or “find”, could be added to the image to make it more realistic, nor could anything be taken away. The drawing was as close to the object as all parts of the object are to itself, so much so that to add or even to detract would be to add in an unwanted external, something invented, or found.

We do not know what the two men would have made of the plat of the landscape at Hull, but it is worth bearing their response to the plat of Guines in mind when we consider figure 15, a map which is likely to have been made soon after the Guines images by John

⁵⁸ See Shelby (1967), p.12-23.

⁵⁹ Cited Shelby (1967), p.13. This document is in the State Papers of the National archives, which are available to access in Microfilm or online versions only. The original document is badly damaged, and while I have largely relied on my own transcriptions throughout my work with Henry’s correspondence this letter was illegible in reproduction. Shelby clearly also had some difficulty reading the original, because he speaks of using an ultraviolet light on the original page. I have therefore used his transcription.

Rogers.⁶⁰ It is not easy to orientate oneself within the plat; the large highly textured space on the left of the image is the Humber; about halfway down the image and branching off to the right is the river Hull and at the intersection between Hull River and Humber the town of Hull is still just visible, despite the damage. The map is large, 100 x 130 cm, and it is clearly meant to depict the landscape *around* Hull for within this space Hull town, when undamaged, could have been no more than a few centimeters across. An extant document which records the Royal works to be made at Hull in 1541 (see footnote REF 28) orders the clearing of the “suses” and “ditches” which supply water to the town, and it seems likely that the map was made either to chart an existing pattern of waterways or plan them anew. This pattern of waterways can be seen in the top right hand corner of the plat: the network of ditches would, before the plat was damaged, have been far larger, and the outer fringes of the works can still be seen at the edge of the Humber. The lines used to mark out these ditches are familiar from Guines, they are fine, precisely proportioned and are drawn, we must presume, in reference to the scale bar in the lower right of the map. Yet while the edges of the Humber river are, we once again assume, a scale representation of the outer profile of the river, the draughtsman has filled in the space contained by these scale lines with thick black strokes which do not contain meaning by the precision of their proportions but by giving a loose impression of the rapidly shifting and repetitious surface of water.

For someone looking at the reproduction these marks are not likely to confuse a viewer into misinterpreting the plat. Yet they do complicate our interpretation, be it only slightly, for the viewer must now move around the picture aware that they may have to separate those lines that contain meaning by giving an impressionistic sense of texture from the scale lines, those marks which relate with a given ratio to distances in the real world. For someone looking at the original, which is over a meter square, the map’s use of scale line and texture becomes quickly ambiguous.

⁶⁰Shelby argues both images were drawn by Rogers and we know Rogers moved between Guines and Hull at around the time these plats were likely to have been produced. This plat is likely to have been drawn up in response to Henry’s visit to Hull in 1541, for there is an extant document of the 4 October (The National Archives, MS SP 1/167 f.69r) which lists the works the King intends to undertake on the fortifications of Hull and the surrounding area. Two of the items on this list state, ‘Item it is thought necessary that the town Ditches be scoured and made deper and the water to serve the town to be brought thorough the kinge majestis house and of the wast water comyng from thence conducted to ryse in the town for the furniture of the same Item the suses to be vied and newe made that they maye sirve to drown about the town as the cace shall require.’ Although the pattern of marks in the top right of figure 15 at first appear to be roads, they are in fact a network of waterways. It seems likely that the plat was made, with the other extant images of the Hull fortifications, to show the king the works on Hull waterways proposed in late 1541.

In an inversion of the textures we might expect, the surface of the roads are represented with markings similar to the surface of the Humber, and while the surface of the ditches and waterways are left blank, they are emphasized by a light green wash on the banks. In two places the roads and ditches run side by side and the viewer relies on the heavy annotations to interpret what they are examining. A more analytic viewer may also begin to ^{doubt} whether the outer profile of the Hull River, the river coming off the Humber to the right hand side, is drawn using scale or impressionistic marks. Are its curves, a viewer may ask, not too round and too regular? Are they being used to give the impression that this is a river? Or do they represent a to-scale image of its meanders? The draughtsman adds to this confusion by drawing what could be impressionistic patterns of some parts of the watercourses within the network of the “suses” and “ditches,” an area of marks which we at first take to be drawn to scale. Figures 16 and 17 are my own freehand reproductions of two of the ambiguous parts of the watercourses, and the areas they magnify are marked in figure 15. Like the curves of the Hull River, the lines of the waterway in figure 16 seem suspiciously like the impressionistic curves with which one might show that something is a river, and we may doubt that they are lines showing the to-scale course of an actual river. And the springs in figure 17 are clearly an impressionistic representation of the path of the springs, a representation that has an ambiguous relationship to features in the real world, especially when placed among the network of scale lines used to represent the watercourses themselves.

The plat of Hull uses its marks and lines in a completely different way from the images of Guines despite the fact that the two plats are likely to have been drawn within a year of each other by the same draughtsman. Within the Hull image the draughtsman moves ambiguously between the impressionistic and the scale line, and leaves the viewer to decide what kind of mark they are looking at. Alongside this he uses the textures so inconsistently that the viewer has recourse to the annotations to understand what kind of landscape-surface the texture is representing. In contrast, the Guines images suppress the patterns of stone and wood on the surfaces of the fortification and isolate the fortifications from the texture of the landscapes in which they are situated, to leave a set of lines which all relate to distances in the real world by a consistent ratio.

I have argued that Southampton and Russell’s words about how they “cannot invent or find [...] how conveniently to add or to detract any]thing” responds to a sense that the

Guines images so closely partake in the substance of the fortification itself that any addition or detracting would be to distort the image by grafting on something external. Yet the counter-intuitive conclusion of my own analysis is that the Guines plats create this effect by abstracting their lines from the reality of a building's substance, its wood and stone, its irregularities, and the texture and shape of the landscape in which it is placed. Yet it is paradoxically this abstraction which makes the image seem as though it is a technical, neutral and accurate representation, for the image does not get caught up in the ambiguous lines of impressionistic representation used to represent the substance of material objects, the lines which so confuse the Hull image.

This is the quality that I intend to invoke when speaking of the drawings at Byland and Guines as graphic abstractions, the extent to which both drawings represent their subject by tracing the finest borderlines around its profile and cutting away all the qualities of its subject that might replicate how it would be perceived in the real world. In one of the most extensive analyses of English local maps P.D.A Harvey refers consistently to the technical drawings made by Rogers as "views" of their subject⁶¹ and as such they are related to the viewpoints taken in the perspective drawings of the fine arts. Yet within the context I am describing technical drawings are not "views" in so far as this term suggests that they are mimetic representations taken from a position which attempts to replicate the experience of human perspective. In one sense, a technical drawing does not represent its *subject*, but only traces the shape of the physical space which it takes up. It is an exploration not of subject, but only dimension. At Byland we see that this mode was developed because the drawings were in fact first used to lay out the dimensions of the subject, both the total shape of the rose window and at the same time the profiles of the individual stones. Technical drawing was, from its earliest inception, used to work physical dimensions and construction details not to portray some elements of its appearance. In this sense, technical drawings that do not contain pictures which represent, but working drawing which were used to construct.

The drawings at Byland were made in the 1190s and while the tracing floors at York and Wells are, respectively, constructed in the 1290s and c.1285, the floor at York is used to

⁶¹ P.D.A. Harvey, *The History of Topographical Maps, Symbols, Pictures and Surveys* (London: Thames and Hudson, 1980), p. 9-26.

draw out images of work that has so far been dated as late as the 1520s.⁶² They therefore provide a way of considering how the drawing conventions and construction techniques developed at Byland continue to be taught to successive generations of master masons well into the reign of Henry VIII. However, there is a particular methodological problem with the analysis of tracing floors. Namely, that there are so many lines on the two surviving tracing floors that published reproductions are necessarily highly selective in the lines they choose to reproduce (and there have only been two attempts at a necessarily partial reproduction, published by John Harvey in 1968 and Arnold Pacey in 2009).⁶³ The problem is that Pacey, who produces the only analysis that looks extensively at the floors, understandably reproduces the lines that are relevant to the architectural features he wishes to discuss. The following sections rely heavily on his analysis because the only available images are produced to accompany his argument. Original analysis would have relied on my own survey of the tracing floors, an undertaking involving the cooperation of the cathedral authorities and the use of photogrammetric reproduction that proved impossible within the limits of this project. My own work is therefore limited to the discussion of the drawings that Pacey has painstakingly charted and reproduced.

The drawings on the tracing floors of York and Wells use a mode of representation familiar from the Byland floor. One of the clearest drawings on either floor, a large window that represents the tracery in the south choir of York Cathedral, can be seen in figure 18, where its apex is labelled with an “a”. It is very unusual for a complete drawing of an architectural feature to have been incised into the plaster floors at York and Wells. Often, only a few of the principle curves seem to have been permanently scored into the surface and the drawings were probably completed in chalk.⁶⁴ Pacey describes one line on the York floor which is studded with the holes made by compass points being repeatedly pressed into its surface, but with which no complete drawings can be associated. He suggests that it was

⁶² A. B. Holton, ‘The Working Space of the Medieval Master Mason: The Tracing Houses of York Minster and Wells Cathedral’ in *Proceedings of the Second International Congress on Construction History Volume II*, (2006), p1579-1597, reproduced at <<http://www.arct.cam.ac.uk/Downloads/ichs/vol-2-1579-1598-holton.pdf>> [accessed 10th July 2013]

⁶³ See: J.H. Harvey, ‘The Tracing Floor of York Minster’, in *The Engineering of Medieval Cathedrals*, ed. by L. T. Courtenay (Aldershot: Ashgate Publishing, 1997), p.81-86; Pacey (2007), esp. p.59-73, p.117-133.

⁶⁴ It occurs to me that as window tracery is symmetrical until relatively late in the Gothic period it would presumably only have been necessary to draw out one half of a design, as the templates carved out from the left hand side of a traced image could be turned over and re-used to carve stones which when put together would give a right hand version in mirror image of the left.

used repeatedly as a base line for a number of drawings completed in chalk.⁶⁵ However, one set of drawings on the tracing floors of Wells may be singled out because they develop the graphic techniques first seen at Byland by combining a plan view and an elevation of their subject in the same drawing. The earliest extant evidence of this technique comes from the 1390s and is found in the wall drawings at St Mary's Church in Ashwell (see fig 19).⁶⁶ However, in the drawing on the Wells tracing floor it is easier to visualise what is being represented.⁶⁷ Figure 20 is a photograph of the drawing and gives some idea of how faint the lines on the drawing surface have become. Pacey's approach to the floor is to first isolate a specific set of lines that seem to be related. In this case he relates the parallel curves visible on the right of figure 20 to a base line, and this offers an initial premise as to the extent of the drawing. The small area selected, with the curves clearly visible and the base line marked with the letters x and y, is reproduced in figure 21. In this case it seems that figure 21 is half a symmetrical drawing which, following a survey of the windows of Wells Cathedral, was seen to relate to the tracery in the eastern walk of the cloisters, a part of the abbey which is datable to the 1420s.⁶⁸ Figure 22 superimposes a detail from the cloister window over the drawing on the tracing floor. Pacey's reconstruction of the drawing isolates a relatively small area centred on a base line and then extends its examination over a far wider area of the floor. He writes:

With the drawing of the window re-constructed in this way (Fig 23) what then called for explanation was a circle on the base line of the drawing (on the extreme right in Figures 21 and 22). This did not make sense as part of the window drawing, but is set out as if related in some manner. [that is, it shares the base line Pacey identified]

⁶⁵ See Pacey, (2007), p.43. Pacey also makes the point that drawings could have been made from this baseline straight onto a set of wooden boards, which could then have been cut up to be used as templates.

⁶⁶ Figure 19 shows a drawing of a narrow window which is likely to have been drawn in the 1360s when the church tower was re-built. The most apparent shape in the drawing is an outline of the elevation of the window, that is, a view of the window as it would appear to someone standing on a plane horizontal to the ground and in front of the window. This elevation is combined with a plan view of the window opening, that is, a view of the subject as if seen from above, with the oblique line at A representing the external face of the splayed window jamb, and the three lines at B, showing variant designs for the inner face. The drawing can be a little hard to understand because of the counter-intuitive way sloping surfaces appear in plan view. Essentially the oblique lines Pacey labels represent the angled splay which often surrounds medieval windows and which join the discrepancies between a thick, loadbearing wall and the narrower stones used in the window frame, consider for example the angled surfaces below the windows at Byland abbey seen in figure 12. see Pacey (2007) p.41 esp. the description of fig. 2.6.

⁶⁷ See: Pacey (2007), p.65-71 for the discussion of the drawings on the Wells tracing floor.

⁶⁸ Pacey (2007), p.68.

Moreover, there were lines radiating from the circle extending across the tracing floor below the window drawing. Figure 24 was drawn as an outline plan of the whole tracing floor with the window drawing at the top and the lines which radiate from the circle on the right.⁶⁹

What becomes apparent in Pacey's argument is that the pattern of radiating lines extending from the circle constructed on the baseline of the tracery seems to match the pattern of the roof vaulting above the window, which is shown in figure 25. The difficulties of Pacey's analysis arise because the lines of this vaulting are only partially drawn in (as figure 24 shows by dashing the projected lines and filling in the lines which can be seen on the tracing floor). But in some areas, each vault rib that can be recognised on the tracing floor seems to be shown both by its centre line and with two parallel lines indicating its width.⁷⁰

The circle on the base line of the window tracery does in fact relate to a real feature, a column that runs vertically next to the window. In the drawing this column is represented in plan view which relates it to the plan view of the roof vault. As figure 24 suggests, its centre is used as the starting point to lay out the ribs of the roof vault (which do in actuality branch out of the top of the column in the real cloister window). This drawing uses two different viewpoints within the same image; the column is drawn in plan view (as a circle) in order to find a centre point from which the rib vaults can be drawn, and not as a rectangle/cylinder which would relate it to the elevation of the window that it is portrayed next to it. This is a particularly neat piece of shorthand, for the diameter of the circle portrays the proportional relationship between the size of the column and the window without having to portray the column in elevation, and allows the draftsman to work out the length of the rib vaults from the centre point of the column's circle.

The tracing floor is here being used as a way of constructing a model of the physical dimensions of two planes of its subject, both the plan of the roof vault and supporting column and the elevation of the window. This combined projection is used at the expense of replicating a single coherent viewpoint. Pacey writes that the combined view of elevation and plan 'seems to have been well established and provided an effective way of conceptualising a three dimensional design,' and though it may conceptualize the design it

⁶⁹ Pacey (2007), p.67-68.

⁷⁰ Pacey (2007), p.70-71.

does not seek to replicate how the window bay will look, for the vault and tracery are connected in a way which has no relation to their final appearance in the cloister. The drawing is a highly schematic exploration of physical dimension. Its purpose seems to be to lay out the dimensions and construction details of two planes as quickly as possible, and in a compact space. It is this schematic quality, the simplification of the image down to a set of boundary lines which relates the drawing at Wells to those at Byland and Guines, and distinguishes technical drawing from the observational, ^{pictorial} images of the Middle Ages.

Technical drawing skills were in continuous use up to the point at which Rogers was working as a stone carver at Hampton Court. John Forman was the warden of the masons at Hampton Court in the period immediately preceding Rogers' own work as a stone carver on the site, and he is thought to have been the draftsman of a set of drawings made on the York tracing floor in 1525.⁷¹ Pacey provides an extensive analysis of the drawings at York, which lay out a combined view of the cross-section and elevation of a four centred arch.⁷² Four centred arches were made at both Hampton Court and York, and despite the fact that Forman himself was transferred by Wolsey from Hampton Court to York before it can be proved that Rogers was working on the site, it is almost certain that during his tenure as a stone carver in the 1530s Rogers would have been taught to use technical mode to construct the kinds of work we see Forman drawing at York. As discussed in detail below, Rogers worked in the mason's lodge on the carving of generic stonework and on specialist stones, named particularly as the "hood moulds" or spandrels, the decorative panels at the corners of arches and carefully portrayed in Forman's drawings.⁷³

The examples of technical drawings discussed above stretch from the 1190s to the 1520s and show how a continuing tradition of technical drawing was being refined and developed up to the date at which Rogers was training as a master mason. Though made over three hundred years apart, the lines and curves of these images contain meaning in such a similar way that, laid out alongside one another, the shape and construction details of their subjects would be instantly comparable. There is, I would argue, a continuous tradition of technical drawing which spans the work of a master mason like Rogers at Guines

⁷¹ Pacey (2007), p.130.

⁷² See Pacey (2007), p.129-134.

⁷³ See Pacey (2007), p.132-133. For more information on Rogers career see the opening to chapter two, below and Shelby (1967). On John Forman, see: John Harvey, *English Medieval Architects* (Stroud: Alan Sutton, 1984), p.110. For a discussion of how Forman incorporated the design of spandrels into his drawings of four centred arches see Pacey (2007), p.130.

and the drawings of his forbears. The continuity between these images is established by the consistent use of what I have called the technical idiom, an idiom which was developed throughout the Middle Ages in the full scale work made by masons. This chapter continues by contextualising the two other conceptual and material skills that I have argued were used in the construction of the first English scale drawing at Guines.

The use of the measured groundplan

I began this chapter by arguing that, faced with the problem of representing and redesigning the irregular curves of the walls of Guines, Rogers began by marking out a measured cord box around the existing *enciente* on the hill. I went on to argue that the scale boundary we can still see on the plat of Guines (see fig 1) is in fact a scaled-down version of the measured box which was staked and corded out on the earth. Furthermore, I suggested that Rogers uses both the straight edges of the cord box he could see deviating from curves of the walls, and the box he has drawn on his page to guide his freehand representation of the irregular curves of the walls. This section examines how, given the use of the groundplan as the basic design method in medieval architecture, Rogers was familiar with the use of cord and stakes, and it would not have been unusual for him to have started the works by setting out a measured cord box around the existing walls.

We know that Rogers used stakes and string as a design method from a letter sent in 1548 which describes how Rogers has “traced and staked forth” the design of a new fortification on the ground, and only latterly made a paper design to send to Lord Paget, the recipient of the letter.⁷⁴ There is however some question as to whether the groundplans used in medieval building were in fact measured. As suggested above, there is on-going debate about the use of measured numerical dimensions in architectural design as opposed to the exclusive use of a non-numerical form of constructive geometry. In a recent collection of essays⁷⁵ which analyses data collected from thirteenth and fourteenth century cathedrals and attempts to derive a set of arguments about the various design systems used across a range of sites, there is a roughly even split between those who do not find the use of measured dimensions in the work they examine and those who argue numerical dimensions

⁷⁴ See: ‘Conclusion’ below, for a full citation of the relevant passage and Shelby (1967), p.69.

⁷⁵ Wu (2002).

were used in combination with the techniques of constructive geometry. Two of the essays even present the case for two separate units being used within the single building they consider. However, while the analysis of medieval buildings and the systems used in their design proceeds on a case by case basis, outside the debate over the major English and continental works of the thirteenth and fourteenth centuries there is strong documentary evidence that by the turn of the sixteenth century in England, dimensions were commonly used by masons.

Medieval building contracts are particularly good evidence of the use of dimensions, for a large number of the surviving contracts contain numerical descriptions of the lengths and widths that had been agreed between patron and builder. As early as 1315 an agreement between the representatives of Queen Isabel and four masons for building a wall around the edge of the moat surrounding the Queen's manor specifies that according to the design of one Master Michael of Canterbury, the wall is to be 5 feet wide at its brim, and 12 feet high, and that interspersed along its length, at the distance of one perch, buttresses are to be built. The contract also specifies exactly what type of perch is to be used, that is, an 18 foot perch, and that the masons are to be paid by the perch.⁷⁶ The extensive collection of building contracts collected by Salzman show the use of dimensions to specify the size and height of buildings throughout the fourteenth, fifteenth and sixteenth centuries. Particularly noticeable for their early date and for the details of the dimensions that they specify are the contracts from the building of Boxley Abbey in Kent in 1373; from the construction of the nave at Fotheringay in 1473 and at Eton College, where work took place in the mid-fifteenth century and from which a number of contracts survive.⁷⁷ The 1442 contract from the building work at Eton College is particularly interesting. The contract is made between the masons working at Eton and the quarry supplying the stone and it specifies that a number of worked stones are to be delivered and that 46 feet of this stonework “beryng ful joyntes at

⁷⁶ Salzman (1952), p.422.

⁷⁷ Salzman (1952). For Boxley abbey see: p.448-450, for the contracts from Eton see p.515-516 and p.522-528. The contract made by a mason employed to build the Church at Fotheringay in Northhamptonshire is found in full on p.505-509. The following section is taken from this contract, it exemplifies how specifications of the precise dimensions of the work are used, as well as a clarification of exactly what units are to be used. “The same Will. Horwood hath granthid and undretaken, and by thise same has indentid, graunts, and understke to mak up a new body of a kirk [...] in lenght iiij^{xx} fete from the said quere downward wythin the walles, a meteyard [measuring-yard] of England accounthid alway from iij fete. [...] and in the west end of the said body shall be a stepyll standyng [...] upon three strong and mighty arches vawthid with stoon; the wich steepil shal haf in lenght iiij^{xx} fete after the meteyard, three fete to the yard, above the ground table-stones and xx fote square withynthe walls, the walles beryng six fote thicknesse abof the said ground table-stones.”

the lest iij ynches or more clene appraliied in the forme that is called casshepped according to a molde to thym therof deiuered to the by the said William” are to be sent on by such and such a date.⁷⁸ This contract suggests that by the mid fifteenth century standardised dimensions for feet and inches allowed masons on site to order pre-shaped stones from a quarry with detailed jointing specifications.⁷⁹ It is this kind of familiarity with units that is the background training behind Rogers’ construction of the drawings at Guines, where feet are used to measure the walls themselves and inches are used to construct the scale boundary on the page.

In the journal of William Worcestre there is also some rather more anecdotal evidence of how familiar masons were with measured dimensions. William Worcestre, secretary to Sir John Fastolf, decided, on his master’s death in 1459, to travel on foot from Norfolk to St Micheals Mont in Cornwall. One of the most noticeable things about this account is that he was clearly fascinated by measurements and statistics. Often his commentary on many of the buildings he visited is limited to an explanation of their principle dimensions. These dimensions are sometimes given in ‘steppys’ where he has clearly paced out a building himself, and sometimes in feet or yards. It is possible that he borrowed a measuring rod to gather these dimensions but there are a number of instances where he spoke to masons working on a building and quoted the dimensions they gave. His account gives a strong sense that the masons he met thought of their works in terms of numerical dimensions, one mason working at St Mary Redcliffe, explaining to him that the spire had been 300ft high, but the top 100ft had been thrown down by lightening.⁸⁰ The building contracts we have examined provide hard evidence of how dimensions were used to lay out measured groundplans and specify working dimensions at a building site in relation to the supply of stone, but Worcestre’s account gives a sense of easy familiarity with the idea of discussing and responding to events and processes using numerical units. Both are valuable in suggesting that Rogers would have been familiar with the idea not only of setting out a work through the use of cords and stakes that I have stated were the basic media of medieval design drawings, but also that he was familiar with the idea of using feet to lay out a measured box as well as inches to draw out his scale boundary. Incidentally, a

⁷⁸ Salzman (1952), p.515.

⁷⁹For Salzman’s discussion of this process Salzman (1952), p.123.

⁸⁰See John Harvey, *William Worcestre's Itineraries* (Oxford : Clarendon, 1969). See also: Pacey (2007), p.119-121.

ruler used to lay out small work like the scale boundary has been found on the shipwreck of the Mary Rose (sunk 1545). Within the wreck a twelve inch ruler was uncovered, the central four inches of which were further subdivided into quarters of an inch using dividers or compasses to ensure the divisions were equal.⁸¹ It is the first of its kind to be discovered and though it was presumably owned by a carpenter rather than a mason, it gives a tangible context for the use of small scale measurements and dimensions. Such a ruler was probably used to lay out Rogers scale boundary on the plat of Guines.

The use of the concept of scale in medieval drawing

So far I have argued that scale drawing was neither used nor, more importantly, needed in the process of medieval design and construction. Strictly speaking this is true. However there are some examples of small-scale images that it has been suggested were produced as ways of testing out design ideas in miniature, without, that is, laying out the full scale image on a tracing floor. An example of such a small scale image was found in a pile of rubble at St John's Cambridge, (see fig. 26). Drawings like the one found at St John's were constructed using the system of constructive geometry that is discussed above in relation to the drawing of groundplans. Like groundplans, full-scale and small-scale images of window tracery are thought to have been constructed, not through numerical measurement, but through a sequence of simple geometrical manipulations which used the straightedge and compass to construct a set of intersecting arcs from a baseline. We know that full-scale drawings of window tracery were constructed using the techniques of constructive geometry in the same way that we know groundplans were constructed non-numerically: because they involve the use of irrational dimensions. Coldstream writes of a set of drawings on the tracing floor at York that can be matched line for line with the window in the choir of the Cathedral and states that they demonstrate a proportional system for setting out according to standard non-numerical ratios, for the radius of the arch is 17 feet 10.5 inches, and its width is 12 feet 7 inches, near enough to one of the most familiar approximations of 1: root 2.⁸² Not only does the use of irrational numbers in real,

⁸¹Pacey (2007), p.172.

⁸²Coldstream (2002), p.78.

stonework window tracery suggest that much of the work was set out using constructive geometry, but the drawings of window tracery on tracing floors (in so far as it survives) often bears marks of the geometric manipulations that were used to set out the image. Arnold Pacey analyses a number of these drawings and using the evidence of the construction lines and compass-point marks is able to follow the steps of the constructive geometry that was used to set out many images and their corresponding architectural features.⁸³ The drawing on the small-scale fragment from St John's seen in fig 26 has been analysed both by Martin Bindle⁸⁴, and by Johnston and Gerbino, who point out that,

The drawing is particularly useful because it bears evidence of the way it was set out. [...] In this case, the mason began by creating a baseline at the springing of the main arch, then dividing this line into units of three and eight. The compass marks are still apparent where he struck off the intervals. These measurements gave him the width of the three subsidiary arches and that of the six window lights. Most of the other design features – including the three large circles in the head of the window and the three small circles under the intermediate arches, - were derived from these basic proportions and the initial curves set out from them.⁸⁵

They go on to make the further point that,

What makes this drawing noteworthy, particularly in light of this somewhat rule bound process, is its impromptu character. Stone is not a medium that we associate with sketching. The mason, however, had internalized the technique of constructing geometry to such a degree that he could freely score the slab with the metal point of his compass as though it were a piece of paper.⁸⁶

The argument put forward here is that the process of constructive geometry enabled masons to sketch out a design idea of any size using a set of pre-determined geometric

⁸³Pacey (2007), esp. p.59-86.

⁸⁴See: Martin Bindle, 'A Thirteenth Century Sketch from the Hospital of St John the Evangelist, Cambridge', *Proceedings of the Cambridge Antiquarian Society*, 44 (1961), pp.99-108.

⁸⁵Gerbino and Johnston (2009), p.19-20.

⁸⁶Gerbino and Johnston (2009), p.20.

manipulations and that work started on a small baseline was used to practice the geometric steps used latterly in the full scale drawing. Yet though Gerbino and Johnston donot discuss the point, it is also necessarily the case that while the overall size of a drawing will depend on the length of the baseline on which it is begun, any two images sketched using the same set of geometrical steps or manipulations will have exactly the same internal proportions. They will, in other words, have a scale relationship to one another. Johnston and Gerbino's point is that the St John's image is good evidence of how freely masons used constructive geometry to sketch out ideas, but for our purposes the drawing at St John's shows that masons were familiar with the idea of sketching working drawings using proportionally related images, in an impromptu way, on any stone surface that happened to be to hand. As with Worcestre's anecdotal evidence about the mason's use of measured dimensions, it is this kind of familiarity that seems to me particularly compelling background to Roger's decision to sketch out a scale representation of the walls of Guines. It would in fact have been relatively straightforward for a mason to have worked out a numerical relationship between two images, if, for example, one image were started on a baseline of 10 inches while the full-scale image was projected out from a baseline of 10 feet, but there is no evidence that they used this technique to draft work of a known, numerical, scalar ratio.

The St John's image is not an isolated example of small scale drawing and, as we might expect, these small images of window tracery tend to be found at sites where full-scale drawings have also survived. Arnold Pacey draws an important distinction and argues that many of the small sketches of window tracery found in churches and cathedrals seem to be casual graffiti and it is not always clear whether a drawing was made by a mason, but he suggests that where drawings appear to be serious representations of windows, particularly where compasses were used in drawing them, they can be understood as preliminary ideas for window designs.⁸⁷ Of particular note are the small scale designs which survive at Lincoln Cathedral, where there are several small mural drawings made with compasses, some of which are probably preliminary ideas for the large round window made in the 1220s which is known as the Bishop's Eye.⁸⁸ In the Galilee porch at Ely Cathedral there are preliminary designs for windows inserted into the older walls of the south transept around 1250 as well

⁸⁷Pacey (2007), p.38.

⁸⁸Jennifer Alexander, 'Masons Marks and Stone Bonding', in *The Archaeology of Cathedrals*, ed. by T. Tatton Brown and Julian Munby (Oxford: Oxford University Committee for Archaeology, 1996), p. 219-236.

as a sketch of an elevation of the cathedral. (See Fig 27 and 28) Of the smaller churches there are good drawings at Mary's Church, Ashwell, Hertfordshire and at St Mary's church in Gamlingay, Cambridgeshire.⁸⁹ Given the poor survival rate of medieval drawing and the amount of small-scale sketches that survive we can only suppose that such work was made reasonably regularly.⁹⁰ The surviving images are mostly drawn into stone and much work incised into plaster walls and floors has been lost. In one particularly tantalizing reference G.C. Coulton writes of an instance at Castle Acre Priory in Norfolk where, in 1881, severe frosts peeled a layer of plaster from one of the niches in the south transept and revealed an earlier plaster surface, on which 'an elaborate window had been sketched.' However, by 1913 only a few strokes were still visible.⁹¹

A small scale drawing which was made on parchment has however survived through its collation into a book of medieval manuscript drawings preserved among the library of Samuel Pepys. The book contains 24 folios with drawings made by several different people and it is thought to have been collated into a binding in around 1380. Three of the drawings represent architectural detail, and were apparently drawn by masons. For the rest, which includes sheets covered with animals, birds and human figures, the drawing book has been interpreted as a 'model book' intended to provide patterns or models which makers of stained glass windows might copy, or perhaps MS illuminators and embroiderers.⁹² Two of the mason's drawings in the book show profiles of mouldings (see fig 29) and were perhaps small scale sketches of template patterns. The third is a drawing of window tracery whose outline has been drawn on the parchment using the point of a dry point scorer. A similar tool was used to sketch out the drawing on the St John's fragment and, indeed, to draw many of the surviving masonic drawings into plaster and stone surfaces. Pacey comments on this sketch and provides a reproduction because the incised original is too faint to be seen photographically (see Fig. 30 and 31). Pacey also writes of the constructive geometry used to make the image but notes that the important section of the parchment was cut off when the page was cut to the size of the manuscript book. He writes,

⁸⁹David Sherlock, *Ashwell Church: Medieval Drawings and Writings* (Ashwell: Ashwell Parish Church, 1978).

⁹⁰ For more information on small-scale sketches see: Pacey (2007) p.33-41 and G.G. Coulton, *Art and the Reformation* (Oxford: Basil Blackwell, 1928), p.179.

⁹¹ Coulton (1928), pp.178-79.

⁹² Pacey (2007) p.125-126; Christa Grossinger, *The World Upside Down: English Misericords* (London: Harvey Miller, 1997), pp.201-8.

Almost a third of the window was lost from the drawing when it was cut down. Black dots in fig 30 show holes in the parchment where the compass point was placed to draw the curves. If the sheet had not been trimmed so drastically, we would probably have seen that the method used in setting out the drawing was the same as may be observed on tracing floors and mural drawings. A base line was drawn across the lowest part of the tracery. [...] the mason placed his compass point at various locations along this line to race out the curves that form the main outline of the design. In this instance, curves were first drawn for a taller, more sharply pointed window, and then were abandoned in favour of a more rounded shape⁹³

Pacey's analysis of the image is limited by the lost section of the drawing but we can see that like the drawing on the fragment of stone from St John's, this image was constructed using simple geometric steps which could be repeated using a larger baseline in order to construct a full scale image. This drawing was clearly used to try out a design using two different types of curve in the construction of the main arch, a taller more sharply pointed window and a flatter arch. This is a simple example of these sketches being used to model alternative design ideas at a preliminary stage. The general point I would emphasise is that there is good evidence of masons trying out images which could then be scaled up by the repetition of a now familiar set of geometric steps based on a full size baseline. Non-numerical scale drawing was likely to have been part of the regular design practice of masons and though the survival rate of these drawings offers a less coherent time-frame than that we have for the full-scale images, the majority of small-scale work dates from the 1200s so the use of small-scale work can date at the least from this period. ⁹⁴

In so far as I have been able to discover, the possibility that the concept of scale drawing was familiar to medieval masons through the interrelation of small- and full-scale images drawn in proportion has not been discussed by architectural historians. It may show masons using scale drawing indirectly, almost as a by-product of the process of design using constructive geometry, but even with this caveat in mind, the fact that a non-numerical scale

⁹³Pacey (2007), p.125.

⁹⁴As Pacey notes, aside from the Pepys sketchbook, 14th century work is poorly represented in the extant records. He does however cite two interesting examples: a six sided font at Ewerby, Lincolnshire in which five sides are decorated with different small scale window designs. And a similar, somewhat earlier, tracery 'sketchbook' on a font at Stamford, also in Lincolnshire. On these fonts see: W.D. Wilson, 'The work of the Heckington lodge of masons, 1315-1345', *Lincolnshire History and Archaeology* 15 (1980), pp.21-28.

drawing was used in medieval design drawing seems to me to offer an important precedent to Rogers' own connection of the full scale corded box around Guines, to the scale boundary on the page in the ratio where "The Inshe conteynyth L fotte."⁹⁵

The origins of scale drawing are of great interest to architectural historians. Arnold Pacey, who produces the only comprehensive analysis of extant architectural drawing offers an alternative version for the origins of the concept of scale in the Middle Ages: he argues that scale drawing arose among masons working on decorative features in churches. My own work on the observational drawings made at Southwell Minster which begins chapter two can be used to present a similar argument. In this section, I suggest that the carvings of leaves made in the various ecclesiastical buildings at Southwell may have been based on drawings or on the observation of real leaves, but in either case they are surprisingly accurate representations of foliage. A.C. Seward, an early botanist who analysed the leaves in an attempt to identify their origins, noted that over the surface of a single column's capital the mason has replicated the distinctive structure of the two main varieties of oak which grow in England, not only speckling their surfaces with the small insects known as oak galls, but also going so far as to replicate the basal auricle, a small flap which grows low down on the base of the stem and is unique to one of the two varieties portrayed. In writing of these leaves it comes as some surprise to Nicholas Pevsner that given this biological accuracy, the close attention paid to surface detail and the flex and growth structure of the leaves that "it never occurred to him to keep to a uniform scale. Hawthorn leaves are no smaller than maple leaves."⁹⁶ Implicit in Pevsner's point is the fact that the masons carving at Southwell utterly disregarded the actual size of the leaf, while closely replicating the internal proportions between the fingers of say, a hawthorn as opposed to a maple. It is unknown whether the mason would have worked from drawings or from real life,⁹⁷ but it seems that the mason had a method of either manually re-working his drawings to enlarge or downsize them, or was able to produce such work freehand from his observation of drawings and/or real leaves.

⁹⁵London, The British Library, MS Aug. I. Supp. 14.

⁹⁶Nikolaus Pevsner, *The Leaves of Southwell* (Harmondsworth: Penguin, 1945), p.20.

⁹⁷See the introduction to chapter two for further discussion of the use of observational drawings.

There is some later evidence collected by Arnold Pacey which shows carpenters manually enlarging printed continental images of various figures and animals in order to work them into decorative wood work, particularly misericords. He argues that

the experience of craftsmen who enlarged small prints and pictures to the size of the item they were carving may have been formative. In many cases, they merely sketched out the enlarged drawing, but quite often it seems that measurements were taken and the enlargement was then fairly precise. Occasionally a grid of lines would be drawn over the picture being enlarged and the contents of each square would be sketched into the corresponding square of an enlarged grid.⁹⁸

Pacey suggests that the printed continental images were often enlarged freehand but occasionally a more formal process of enlarging segments would have been used. However his evidence for the claim is not particularly extensive. The fact that masons were able to enlarge accurately using freehand representation is in fact also implicit in an event narrated by William Worcestre at the point where he describes meeting a mason called Benedict Crosse at St Stephen's Church in Bristol in 1480. Worcestre seems to have been particularly taken with the "ingengious workmanship" of the molding around the south portal (see fig 32 and 33) and, uniquely in the journal, he has provided a small sketch of the work (fig 34). Gerbino and Johnston's own analysis of this highly unusual image is particularly apposite for the current argument

The sketch is something of an oddity: rather than a view of the portal – as we might expect in a tourists journal – it is a technical drawing of its cross-section. That circumstance and the lack of any similar drawings in the notebook suggest that it was Crosse himself who drew it and who also supplied the names for each of the portal's composite mouldings [...] the drawing was probably based on the template that Crosse had been using to cut the stones for the jamb. [...] he appears to have been able to replicate the portal jamb quickly and on a reduced size without distorting the

⁹⁸Pacey (2007), p.172.

proportions of its internal mouldings, which suggests that making and using such small scale drawings was not unusual for him.⁹⁹

Gerbino and Johnston argue that Crosse himself drew the image and that, furthermore, he was able to “replicate the portal jamb quickly and on a reduced size without distorting the proportions of its internal mouldings.” What they suggest is that Crosse is able to work graphically in a way that would probably have been instrumental in carving the leaves at Southwell Minster: enlarging and downsizing an image freehand without distorting its internal proportions, and that he was familiar enough with this process to produce an accurate sketch in the notebook of a passing layman with an interest in architectural design.

There is then good evidence to suggest that during the Middle Ages there were two sets of drawings, both decorative and technical, which seem to have been scaled up and down by medieval masons as a routine part of their work. There are important differences between the ways in which the scale proportions are maintained in the technical and the observational drawings and carvings: the former uses the manipulations of constructive geometry, the latter relies on the mason’s own freehand ability to change the size of the subject. Yet the important point is that both techniques suggest that there was a medieval craft tradition in which the idea of scalar enlargement and reduction was familiar. The evidence furthermore suggests that this craft tradition would regularly have been making non-numerical scale drawings.

The more general point is that paper scale drawings of a complete building seem not to have been used as part of the design or the construction process before 1530s and 1540s. However, in the systems of architectural design and construction which were used in the medieval design there is good evidence of the three material techniques and conceptual skills that I have argued were used to make the Guines plats. Evidence, in other words, of the consistent use of the technical idiom and the measured groundplan, as well as evidence that master masons were familiar with the concept of scale through a form of scale representation that produced scale drawings of both a technical and observational kind, even if the numerical ratio that connected the small and large images was unknown.

⁹⁹ Gerbino and Johnston (2010), p.22.

iv. Why was Scale Drawing Not Used in the Middle Ages?

The argument put forward in this chapter is that medieval master masons regularly used the graphic forms and material skills which I have suggested were passed on to Rogers in his training as a mason, and which were used in the drafting of his scale drawings at Guines. The extension of this argument is that no external continental influence is required to explain the changes we see in the local maps and plans of the sixteenth century, for the graphic techniques and material skills used to construct the most technically advanced of the sixteenth century plans were in use throughout the Middle Ages. I would argue that to understand the local maps of the sixteenth century we must look at the circumstances which caused the masons to use old graphic skills in new ways, not search for evidence which shows that a whole set of new graphic techniques were introduced from continental Europe. The increased influence of patrons in the fifteenth and sixteenth century encouraged masons to adapt the design processes used in an earlier period to satisfy the new set of demands being made of them, and this in part explains why small-scale design drawings of complete buildings start being made during this period. But before proceeding to examine the effect of patronage over the forms of medieval design drawings there is an important argument to be made which explains why, regardless of patronage, small scale design drawings of complete buildings were not made before the 1530s. The following argument suggests that these drawings were not used in an earlier period because the processes through which Gothic buildings were designed actively discouraged the use of small scale drawings.

As I have suggested, in the medieval period technical drawing was the medium through which medieval masons were able to manage the most delicate and logistically complex form of construction work, that is, the carving of the special and the standard stones which when put together formed the superstructure of the work. This idea is counter-intuitive because for us the idea of design drawing is intimately involved with shaping the total image of a building. Modern architects may be more or less involved with the construction details of their designs, and the extent of this involvement will vary, but the design drawing can still be a space in which to communicate radically new design concepts with which to plan and shape the whole aesthetic effect of a building. However, for the

medieval mason, control over the total image of the work was exercised through design drawings made for the stone-by-stone carving going on by under-masons working in the yard. This in part explains why there was no need for scale drawings of a complete building, for the architectural drawings of the period were used not to guide the design of the whole building but to design the template, and so in turn, the work of masons cutting out the single stones of the superstructure.

Architectural historians have noted that the medieval mason differed from the modern architect in so far as he was trained in the practical techniques through which buildings were put together. Nicola Coldstream summarizes this point of view. She criticizes those scholars who “see in the emphasis on drawing a trend away from the mason as builder towards the architect as designer” and focusing on the French mason Pierre Robin who worked on the church of St Maclou in the 1430s, she writes that,

Neither Pierre Robin nor his successful colleagues was an architect in the modern sense that this implies. Unlike his modern counterpart, Pierre Robin knew how to build. His training on the building site gave him the knowledge of the curvatures that would produce strong arches, vault webs, buttresses and towers. Without it he would not have been able to design the templates for the stones to be worked. Drawing, however sophisticated it became, was the product of practical craft skills, not a substitute for them. [...] it is the identification of the design with the structure that characterizes the practice of architecture in the medieval period.¹⁰⁰

Coldstream argues that design drawing was a derivative of the practical craft skills in which a mason was trained and this supports my own argument that drawing was inextricably intertwined with the material methods through which a building was made. In the history I have outlined each stage of the drawing process sets up the next stage in the construction of a building: the full-scale groundplan was used to generate the dimensions for the various part of a building and set out the guidelines for the digging of the foundations; the full-scale drawings of roof vault and window tracery on the tracing floor were divided into parts and used to work out the shape of the wooden templates used in the stoneyard. We know that

¹⁰⁰ Coldstream (2002), p.72-3.

at no point in this process was a complete image of the work made and this must in part have been because drawings were simply not understood in this way. Design drawings were used to control the specific set of material tasks needed to continue the building process and were not opportunities for working out radical new designs for the complete building.

The master mason's job was also not limited to setting out design drawings; he was often primarily responsible for a whole range of tasks like the supply of skilled labor and the supply of materials, negotiations with the patron and the production and accuracy of the financial accounts of the works.¹⁰¹ The master mason was in fact in charge of the total construction system, and laying out design drawings constituted one among a number of methods used by masons to control the works. This point is implicit in a passage from one of the earliest accounts of a mason at work in England written by Gervase of Canterbury, who records that once the monks consented to the tearing down of the burnt quire, William of Sens, the mason,

addressed himself to the procuring of stone from beyond the sea. He constructed ingenious machines for loading and unloading ships, and for lifting masonry and stones. He delivered moulds for shaping stones to the sculptors who were assembled and diligently prepared other things of the same kind.¹⁰²

This brief account gives us a partial view of how, in 1174, a mason starting work at a building site was visibly involved not only with the design of the building but also with the whole process of contriving a complete organizational structure at the works; a structure which included the procurement of materials, the equipment for their transport and placement, and the delivery of the working drawings of the site.¹⁰³ Masons were not only responsible for the design and manufacture of a building on a stone-by-stone basis, but they were also responsible for setting up a system capable of implementing any radical design changes. This must have fundamentally altered how masons viewed the process of design, which was intimately involved with the process of a concept's actualization in the real world, not simply

¹⁰¹ See Shelby (1964), pp.387-403 (esp. p.402-3).

¹⁰² Salzman (1952), p.370.

¹⁰³ Salzman (1952) is a history of building in England that provides an exhaustive survey of the various construction processes in which the mason was involved and is still the primary work of reference on the whole construction process.

the drawing board. It must have discouraged the drafting of completely new concepts and encouraged incremental change effected through the processes of construction itself. Such changes may have involved working out a new design of rose window and a new set of templates for the stonecutters but, equally, innovative structures may have involved the design of more effective lifting devices, or different types of stone more efficiently supplied, or more reliable and better skilled labor sources.

This is the context against which to view the use of medieval architectural drawing, one in which the total design of the work was always mediated through the process of its construction. At no point is a total image of the works particularly relevant for a designer/builder materially involved with the continuing processes of construction. This contextualizes the lack of scale drawings of the total works in the Middle Ages, but it also foregrounds the fact that there was no reason why the elements required to draw to scale may not have flourished within this system. The reason scale drawing was not used was not because of a lack of knowledge or skill, but because the contemporary circumstances in which technical full-scale drawings were made discouraged the movement to small scale images of the complete works. Design was intertwined with the methods of construction and radical new designs that might have suited the production of scale drawings were limited by the fact that all innovations had to be negotiated through the material methods that could be used to put this design in place.

This chapter has examined the graphic skills of the master mason in the sixteenth century by looking at the medieval architectural tradition in which men like John Rogers were trained. As a case study for the connections between a medieval and early modern form of technical drawing I have looked at the origins of scale drawing in the graphic techniques of the Middle Ages, and suggested that we see all the graphic and material skills that were needed to make scale drawings in 1540 in regular usage during the Middle Ages. I have suggested a reason why scale drawings were not made in the Middle Ages, despite their familiarity with these techniques, and will come to suggest that it is the changing way in which plans were used in the sixteenth century that led to old drawing techniques being combined in new ways.

Over the next two chapters this study looks at how architectural drawing techniques are used by sixteenth century masons to make new kinds of architectural and topographical

plats under the pressures imposed by Henry VIII. Chapter one has been largely concerned with the technical context of sixteenth century maps, both the intellectual techniques of manipulating geographical information and the tool-based techniques for surveying a feature and constructing an image on the page. This chapter has contributed new research to the study of sixteenth century maps by arguing that there is an identifiable body of work drawn during the Middle Ages in what I have called the technical idiom, and that this work needs to be seen as providing the conceptual skills and practical drawing techniques that lie behind the technical plats of the sixteenth century. It has also suggested an entirely new argument for the origins of scale drawing in England, while taking this subject as a case study of the connections between medieval and early modern techniques. The following chapters make it clear that this history is central to an examination of local maps in the sixteenth century, for the medieval technical skills that have been described above are used by sixteenth century master masons to respond to the changing demands of sixteenth century patrons.

Chapter Two. Drawings for patrons 1450-1529

This chapter is the first part of a history of how the technical style used in working drawings begins to be used in the plats made for patrons. This history is concluded in chapters three and four. It is only in the 1530s that the images made for patrons begin to incorporate the technical idiom but the developments of the 1530s are a response to the existing genre of pictorial images that had been made for patrons since the mid 1400s. Understanding sixteenth century developments relies on a knowledge of the early pictorial images which are made for patrons before Henry VIII. The body of this chapter examines the extant observational drawings of the fifteenth and early sixteenth century and the written contracts that these images accompanied.

This chapter analyses the period between two points of transition. The later point is marked by the incorporation of technical drawing into plats for patrons in the 1530s, the earlier takes place c.1450 when pictorial plats begin to be made for patrons alongside the written contracts that were the sole form of contractual record in use during an earlier period.¹ Up to the mid fifteenth century patrons were probably not provided with any form of drawing while, in a separate part of the construction process, the masons continued to use stake and cord groundplans; full-size drawings of roof vaulting and window tracery and wooden templates to design the building and manage the building process. Chapter two examines the transitional period between c.1450 and the 1530s in which some negotiations between builders and patrons are recorded in written contracts *and* pictorial drawings, and it establishes a context within which to understand the point of transition in the 1530s when the drawings made for patrons begin to be constructed using the technical style that had previously been circulated solely among the masons themselves.

Using a number of examples this chapter shows that before the 1530s there is a shifting balance between the amount of technical information shared between written contracts and pictorial drawings. In some instances the written contract contains a detailed description of the layout, dimensions, building materials, construction methods etc. of a

¹ See: L.F., Salzman, *Building in England Down to 1540; A Documentary History* (Oxford: Clarendon, 1952) (1952) Appendix B, p.413-584, for a full list and transcription of medieval contracts. See chapter below for more details, but in essence, of the 123 building contracts collected and published by Salzman from their first recorded appearance in the archives and up to 1540 at least fifteen documents refer to a plat, while two or three of the earliest references refer ambiguously to a document that could be a drawn image but could also be a written plan or a set of templates.

planned work, while the accompanying plat uses such inconsistent scale and projection that it could only have been used as a very rough guide to the final appearance of the work. In other instances the drawings accompanying plats seem to have been used to portray how much decorative detail was to be cut into the surface of the stones (an important financial consideration) while the written contracts described the layout of the internal spaces. Fifteenth and sixteenth century contractual agreements use words or images in a way that is context specific and the burden of representing the planned work is balanced between plats and written descriptions in a way that responds, in each instance, to the precise demands of the project and the linguistic and graphic skills of both patron and builder.

As suggested above, throughout the period between c.1450 and 1530, technical drawings of the kind examined in chapter one continue to be used by masons to communicate among themselves as part of the design and construction process. However, the technical idiom is not used in plats made for patrons. As chapter three will suggest, under pressure from Henry VIII, plats made for patrons do begin to incorporate the technical idiom in the 1530s. At this point the plats made for patrons can bear far more accurate technical information concerning the dimensions and layout of an architectural work, but even at this point the drawings do not contain *all* the technical information needed to record the agreed design and plats are still part of an negotiation that takes place through written letters and oral discussions between master masons and the King. There is in fact a continual balance between the use of word and image in the representation of both landscape and architectural features up to and throughout Henry VIII's reign and this chapter examines the first stages of this process as pictorial plats begin to share some of the representational burden with written contracts.

This chapter focuses on a number of late fifteenth and early sixteenth century building works and explores the use of plats and written contracts in the period before the 1530s. However, before moving onto these specific examples it proposes an argument for where the observational drawing skills used to draft pictorial plats for patrons might have come from given the craft tradition of the medieval mason which has, so far, solely been considered in so far as it taught masons to draw technically.

i. How Might Masons Have Learnt to Draw Pictorially?

The observational drawing skills with which pictorial plats were made can be traced back to the craft tradition of the medieval masons. The graphic skills taught to Rogers and to masons more generally can be divided into two categories: the observational drawing skills used to carve the decorative surfaces stones, and the technical drawing skills used to lay out two dimensional working drawings. As the most innovative of Henry's craftsmen, Rogers' early life stands as a good example of how masons were taught to draw both technically and pictorially. Lon Shelby's biographical work on Rogers complains that the only points of reference for Rogers before his sudden appearance as the master mason at Guines are some scattered references in the twelve massive but incomplete volumes of works accounts for Hampton Court. He writes that "Unfortunately these references do not tell us a great deal about Rogers,"² but though they may not provide us with colourful biographical facts these references do reveal a few important details about how Rogers was trained in these early years. It seems that between October 1533 and August 1537, Rogers worked in various positions for changing rates of pay: as alternately a 'lodgeman,' that is, a stonecutter working in the masons' lodge or workshop, and as a 'stonesetter,' working on the placing of these cut stones. However, the most intriguing reference tells us that in November 1535 Rogers was paid 12s. for carving special stones 'by convention,' that is, under contract.³ This entry quoted in full states,

Also payd to John Roger of London ffremason ffor in taylyng the becates of the dore in the Kynges great watchyng chambre wyth the beccattes of the chymney in the same chambre, wyth the Kinges badge and the quenys letter by convencion.⁴

The 'becates' of the door are according to Salzman, the "carved bosses at the end of a hood-mold, on either side of a door,"⁵ and on visiting the King's great Watching Chamber at Hampton Court it is relatively easy to work out which stones are here being described, for the doorway to the Watching Chamber frames the King's throne in the great hall, and the becketts of this door are some of the most visible carvings in the entire palace. Unfortunately they were restored during the Victorian period and the original graphic quality of the work

² Lon Shelby, *John Rogers, Tudor Military Engineer* (Oxford: Clarendon, 1967) (1967), p.5.

³ Shelby (1967), p.6.

⁴ Shelby (1967), p.6. (n.2).

⁵ Salzman (1952), p.113.

has been lost. (See figures grouped 35-38 for an explanation of the site) The only extant Tudor carving on a doorway into the Watching Chamber is figure 37, which has however suffered the kind of wear which, no doubt, led to the restoration of the beckets on the main door, and it is difficult to judge the depth or quality of the relief. It is also not the principle door into the Watching Chamber. We can gather a better idea of what the carving on the principal door to the watching chamber (the door labelled “a” in fig. 35) might have looked like from figure 38, which is a photograph of the door at the other end of the great hall. Though worn, it clearly creates depth and texture in its representation of foliage. It is unfortunate that Rogers’ work has largely been lost, yet the extant evidence does firmly illustrate the point that Rogers was trained and paid as sculptor and lodgeman, paid one week to work in the stonemasons’ yard carving out the structural surfaces of stones with reference to the technical lines of templates, and the next to sculpt the decorative surfaces of the blocks with organic shapes and patterns. The accounts show that having carved the beckets of one of the principal doors in the palace, Rogers again returns to, and continues to be paid as a ‘stonesetter’, working on the fixing of cut stones into place within the structure of the work. Even in the sixteenth century, the mason’s role was clearly fluid, moving between working with observational carvings on the surface of the stones (the technical work of projecting three dimensional stones from the wooden templates made up on the tracing floor) and setting the stones into the fabric of the building.

There is clearly some difference between the decorative carving of the surface of stonework and the observational drawings of a building made on paper, but these differences in medium should not be overemphasised for the decorative carvings probably used observational drawings or copied real life subjects and the masons producing drawings for patrons in the 1400s would probably have been trained to draw mimetically.

The leaves carved into the stonework at Southwell Minster have become the focus of an on-going debate about how medieval masons carved with such a high level of mimetic accuracy.⁶ A recent study by Jean Givens argues that the masons (for there is agreed to

⁶ The principle studies are: Arnold Pacey, *Medieval Architectural Drawing: English Craftsmen’s Methods and their Later Persistence c.1200-2700* (Stroud: Tempus, 2007), p.13-19; Jean Givens, ‘The Leaves of Southwell Re-visited’, in *Southwell and Nottinghamshire: Medieval Art, Architecture and Industry* (Leeds: British Archaeological Association, 1998), pp.44-59; Norman Summers, *The Chapter House, Southwell Minster* (Derby: English life publications, 1984); Lawrence Stone, *The Pelican History of Art: Sculpture in Britain: The Middle Ages* (Hammondsworth: Penguin, 1955) p.140,151,168; Nikolaus Pevsner, *The Leaves of Southwell* (Hammondsworth: Penguin, 1945).

have been more than one) carved directly onto the stone with reference to the shapes and textures observed from a set of real leaves collected from the surrounding countryside but she does not comment on whether this process would have involved a set of preliminary drawings. The traditional view put forward by Nicholas Pevsner is that the masons copied the leaves from a book of drawings, made as a result of “English Masons wandering to France, learning at Rheims and the other contemporary cathedrals and churches, and returning with their sketchbooks full of notes of what they had seen and helped in.”⁷ Professor Pacey argues that, “To anybody personally accustomed to making drawings themselves” the view that the masons produced no drawings of the leaves “is not really credible.” He continues, writing that the naturalism of the sculpture arises from “an *intimacy of observation* that comes from repeated attempts to sketch or model a particular subject, and from the visual thinking stimulated by drawing.”⁸ The variety of these arguments emphasises the essential point common to all: that the leaves at Southwell were carved by men closely observing either a two or three dimensional subject, and replicating the experience of this observation in three dimensional carving and possibly in two dimensional, observational drawings.

Rogers’ own work may have contained such features, for though the financial account specifies only that Rogers was commissioned to include both the King’s “badge” and the Queen’s “letters,” at the opposite end of the hall the becketts are carved with pomegranate vines, the motif of the badge of Catherine of Aragon and it is possible that Rogers’ work included similar sorts of foliate carving. The point here is that medieval masons were trained in observational forms of drawing alongside the technical mode, and that this training may in different instances have involved either the sketching of real life subjects on paper or the translation of drawn examples directly onto the stone. In either case, masons were trained in the observation of a subject and its replication in a variety of media. The leaves at Southwell are not an isolated example of the observational drawing skills of the medieval masons, which occur throughout the Middle Ages.⁹ One particularly intriguing set of observational sculptures is carved into corbels of Westminster Abbey. While

⁷ Pevsner (1945), p.49.

⁸ Pacey (2007), p.18. His emphasis.

⁹ See: Paul Williamson, *Gothic Sculpture 1140- 1300* (New Haven, Conn.: Yale University Press, 1995); R. Marks and Paul Williamson, *Gothic Art for England 1400-1547* (London: V & A, 2003); Nicola Coldstream, *Masons and Sculptors* (London: British Museum Press, 1991).

the faces of angels and saints at ground level are relatively expressionless, high up in the eaves of the abbey, the masons have carved a set of corbels which on one side of the abbey show a whole range of exaggerated expressions of joy, and on the other, of anger. Clearly the masons were trained in the mimetic representation of the human face and were able to replicate a wide variety of facial positions all dramatically contorted by extremes.¹⁰ This study now moves on to look at the drawings made for patrons themselves, yet it ought to be remembered that these drawings are themselves derived from the observational skills of masons that were probably developed in relation to observational carvings alongside the technical drawing skills used during the Middle Ages.

ii. The Use of Written contracts and Pictorial Drawings in the Work Made for Patrons before 1530.

None of the earliest pictorial drawings survive, but there is documentary evidence of their existence from c.1400 in the building contracts that refer the reader of the contract to a plat.¹¹ These written contracts were drafted at the design stage of the work and they describe the design of the building being planned, often giving a detailed description of its architectural features: the number of floors, windows, doorways, stairs, rooms and sizes etc. as well as details about the quality of its construction: the type of foundations to be used, the jointing at the principal structural points, the grade of materials of various parts, the thickness of supporting beams and so on. Much of this description uses precise dimensions to specify what has been agreed.

Specifying the details of the design and its quality was in the patron's interest, for, as the contracts make clear, a craftsman was usually paid a total sum based on the specifications agreed at the start of the work, and there must have been some incentive for the mason to build a work as cheaply as possible by diminishing its size ; the quality of its construction, or the materials he used. It was therefore in the patrons interest to lay out exactly what kind of building had been agreed as precisely as possible and we can imagine that builders who had already secured a job were not particularly willing to make a

¹⁰ David Carpenter, 'Westminster Abbey: some Characteristics of its Sculpture. The Workshop of the Censing Angels in the South Transept', *Journal of the British Archaeological Association*, 35 (1972).

¹¹See Salzman (1952), p.413-584

contractual agreement more specific by providing a drawing at an early stage. This may explain the scarcity of the contacts which refer to drawings. For though many contracts survive, only a relatively small number of them refer to plats. Of the 123 building contracts collected and published by Salzman from their first recorded appearance in the archives up to 1540 (the complete corpus of contracts that his research had uncovered by 1952), at least fifteen refer to a drawing, while two or three refer ambiguously to a document that could be a drawn image but could also be a written plan or a set of templates.¹² Of the definite references to a plat three of them relate to the same works: the 1507-1515 works at King's College Cambridge, and two more are post 1500. However, the longevity of the use of these contractual drawings is only of passing relevance to this study, for there is strong evidence of the use of such contractual plats at the point of Henry VIII's accession to the throne in 1507.

There are two clear examples of the type of image that existed more or less simultaneously with Henry's accession to the throne.¹³ The first of these drawings is of a timberframed house and was, consequently, made by a carpenter. This may weaken any conclusions however the two trades worked closely together and they probably shared techniques for communicating with their patrons. Surviving building contracts are often made by masons and carpenters working jointly and even where one of the two trades was employed singly, the contracts made by both masons and carpenters use plats to represent such similar aspects of the project that it is likely comparable images were made by both

¹² The contracts are collected by Salzman (1952) in Appendix B. They are discussed in Salzman (1952), p.13-20. The references that seem to me ambiguous are that made at Eltham in 1315, where it is unclear exactly how the design ideas of Michael of Canterbury were transmitted. (See Salzman (1952), p.422-424.) Similarly, the contract referring to the "forme et molde" supplied to the masons by Henry Yevele could well refer to the use templates rather than drawn plans, (p, 472-473) as could the contract from Boxley abbey in Kent. (p.448-450).

¹³ My discussion here does not consider the earliest pictorial images which have been discovered because its primary focus is on the forms of pictorial representation that Henry might have been using in the early part of his reign, not on the history of the pictorial images with some architectural content. The four images which could be considered relevant are scattered over the time period of the middle ages. They are stylistically diverse and produced by men who were uncertainly connected to the masons. They are:

1. The plat of the waterworks at Canterbury. See: William Urry, 'Canterbury, Kent', in *Local Maps and Plans from Medieval England*, ed. by R.A. Skelton and P.D.A Harvey (Oxford: Clarendon Press, 1986), p.43-58;

Francis Woodman, 'The Waterworks Drawings of the Eadwine Psalter', in *The Eadwine Psalter: Text, Image, and Monastic Culture in Twelfth-century Canterbury*, ed. by Margaret Gibson, T. Heslop and Richard Pfaff (London and University park, PA: Pennsylvania State University Press, 1992), pp.168-177.

2. The plat of the Kitchen at Winchester. See: John Harvey, 'Winchester, Hampshire', in Skelton and Harvey (1986), p.141-147; P.D.A. Harvey, *Maps in Tudor England* (London: British Library, 1993), p.95-96; Catherine Delano-Smith, and Roger Kain, *English Maps: A History* (London: British Library, 1999), p.20, 28-29.

3. The London Plans. See: J.H. Harvey 'Four Fifteenth Century London plans' *London Topographical Record*, 20 (1952); Harvey (1993), p.95-96.

4. The Plans of a Charterhouse. See: M.D. Knowles, 'Clerkenwell and Islington, Middlesex, Mid-15th Century', in Skelton and Harvey (1989), p.221-229; Bruno Barber and Christopher Thomas, *The London Charterhouse* (London and University Press, 1992) p.168-172.

trades.¹⁴ Given this shared expertise and the lack of any other contractual drawings dated before 1500, a carpenter's work is taken as representative of the drawings made by both crafts in the late-fifteenth century.

The drawing of a timber framed house itself only survived because it had been bound into the beginning of the Register of Jerome de Ghinucci, Bishop of Worcester. The Bishop died in 1535 and, given that the registers were usually only bound into books after the death of their respective prelate, the image could only have been made before 1535.¹⁵ However, the drawing itself shows a house that is characteristic of a style of building prevalent in the West Midlands between 1480-1500, so a late fifteenth century date is likely.¹⁶ Given that the drawing has survived in an environment that does not lead to its ready connection to any of the circumstances of its production, drawing simple conclusions as to why the image was made and how it was used involves an examination of internal evidence.

The parchment is drawn on both sides, (see fig 39 and 40); the most striking of these two images portrays the elevation of a timber framed building of three stories with shops on the ground floor. The section of the page that would have shown the roof was probably cut off when the parchment was made into a binding. The reverse side, fig. 40 (see fig 41 for a clearer reproduction of the faint lines of fig. 40), is a much rougher drawing of a cross section of a two storey building. F.B. Charles argues that the two images: one of a two-storey, one of a three-storey house, are in fact of the same building. The rougher cross section is, he argues, a close-up preliminary study of the first floor and the roof, from which the ground floor was omitted. Having drawn out a study of the technically most difficult part of the building, there was, as he suggests, "neither good reason nor space on the parchment to repeat the design simply to show what the designer already knew – that his building was of three stories." As such an extract suggests, Charles is convinced that the rough sketch of the cross section of the house was produced for the carpenter's own benefit and his further analysis of the rough working drawing is instructive: "the duplicated line, trying out variations of shape and proportion; the superimpositions of one detail over another; and the lack of finish" are all, he suggests, characteristic of a private sketch, and are

¹⁴ For a comprehensive selection of carpenters and masons contracts see Salzman (1952), appendix B.

¹⁵ F.D.B Charles, 'A Sixteenth Century Drawing of a Timber Framed Town House', *Transaction of the Worcester Architectural Society*, 3rd Series, iii (1970-2), pp.67-69 (p.67).

¹⁶ For further information on the dating of the document see Charles (1970-2); Pacey (2007), p.139-147.

signs that “the drawing had fulfilled its purpose when each problem had been solved or become clear in the designer’s mind.” He goes on to argue that,

There was no need for anything more elaborate even when it came to actual building – a salutary contrast with the sheaves of technical documents required today when the highly specialised architect has become only the first in a long line of other specialists and officials without whom his design cannot be transformed into a building.¹⁷

The internal evidence provided by the drawing suggests to Charles that the rough sketch is not a working drawing used as part of the actual building of the house, but that it was, in contrast, a private way of thinking through a design problem at an early stage of the planning.

F. B. Charles argues on stylistic grounds that the high-quality elevation of the front of the building (fig 39) was the kind of drawing that would be shown to the client for whom the carpenter was working. If the house was ever built, it has not survived, so we cannot be sure exactly how the drawing relates to its subject. However, Charles attempts to give a numerical scale to the image nevertheless. He writes that in the lower left hand corner of the drawing the first bay window is drawn to a scale of “about three-quarters of an inch to a foot” but he goes on to point out that the drawing is compressed on the right hand side, possibly to fit the required number of bays onto the page. He also suggests that while the ground storey of the house uses a vertical scale of “about three-quarters of an inch to a foot [...]the vertical scale of the drawing is substantially reduced upwards so that the top floor scales to not much more than half an inch a foot.”¹⁸ Charles describes a drawing that starts at the lower left hand end of the page with a scale that is consistent both vertically and horizontally but that this consistency lasts only as far as the first bay of the ground floor, because, as the draughtsman works from left to right, he incrementally compresses the image in order to fit all the bays of the ground floor onto the page. Consequently, the scale at one end of the house does not relate to that at the other end. Having drawn the ground-floor he then moves on to draw the second and third floors and realises that in order to fit them in he will have to compress their dimensions so that the top two floors also become

¹⁷Charles (1970-2), p.70.

¹⁸Charles (1970-2), p.69.

incrementally smaller as the draftsman works up the page. Despite the fact that Charles confidently ascribes figures to the “scale” of this drawing, the scale is so inconsistent that it is probably wrong to think of these distortions as evidence of the fact that the draughtsman has tried and failed to draw to scale. A better way to understand this image is to recognise that we are looking at an image that was produced for a purpose that did not require anything more than a very approximate proportional representation, a drawing from which neither dimensions nor proportions were derived. If the drawing was used to present a general image of the works to the patron (as opposed to being used as a working drawing) it would explain why the scale is approximate enough to give a general idea of the style of the building and a rough idea of how it will look, and also explain why the draughtsman was not overly careful about producing an image which proportionally portrayed its dimensions.

The precise laying out of dimensions was reserved for the written contracts that accompanied these plats. The following contract refers to a plat as a rough guide to the placement of general features while itself giving detailed and accurate dimensional description. The contract itself is made between the Warden of Winchester College and two carpenters to build an inn in Andover, in Hampshire. It concerns a building whose details were being worked out in 1444, shortly before the range of dates offered for the construction of the timber house near Worcester:

The said John and Richard shal wel and counabili' make in so moch as to carpentri bi longeth that is for to sey A inne [...] conteynyn in circuyte 90 fete in the Counte of Suth after a portatur ther of mad or better and acording to the counantis in the endentur rehersid Of the which xvij^{xx} fete iiij^{xx} to be billid north and suth a forestrete uppon the same ground wher on shal be sette in the suth parti' of the foresied ground a chamber xxiiij fete widnesse north and suth and in lenth xx fete [...]¹⁹

The contract goes on to describe the dimensions of the rooms, the stables and the windows, and in the following extract refers back to the “portatur” before going into great detail as to the width of various structural beams which have been agreed on:

¹⁹Salzman (1952), p.518.

Also in the ende of the said Inne that is for to sey in the west part of the same inne al
jbillyd cont' iij^{xx} fete and x like to the north and suth parte savyng a chambyr' over a
gate in the said parti with a joti wyndowe a cordyng to the portratur. Also the
groundsell of the same inne a fote brode and ix inches thikk. The postes of the same j
fote brede and x inches think. The somers acordyng to the same werk. The joistes in
wards vij inches of brede vj thikk and by twyne every joiste viij inches space [...] ²⁰

The contrast here between the presentational drawing with no dimensional accuracy and the written contract specifying the dimensions and structural details of the house in detail helps to understand how these pictorial drawings were used in the late Middle Ages. For a written contract like this would clearly have been of far more use in the construction of the works than an image like that of the Worcester house, where the representation of the building fails to maintain any kind of internal proportional consistency, distorting lengths arbitrarily and unpredictably in both orientations. The drawing acts as a guide to the general layout of a building, as in the example above where the contract refers to the "portratur" in order to clarify where the window it describes is placed in relation to the room over the gate, but the pictorial drawing is not used as anything other than the loosest form of reference point, and the precise details of the work are all described linguistically. The contractual drawings were probably not drawn with an emphasis on dimensional accuracy because that accuracy was contained in the written contracts that were the traditional medieval form of drafting an agreement between patron and builder. In no extant examples of the pictorial plats are numerical dimensions used, despite the fact that numerical lengths are consistently cited in the written contracts. This is understandable: the observational drawing was a very late addition to the written contract and in its early forms it clearly did not take much of the burden of representing the work away from the text of the contract itself. Drawings were used to provide a rough idea of what the two parties have agreed the house will look like when complete while the text contained precise numerical and descriptive details that could be accurately used during construction. Yet as the following examples of contracts and drawings suggest, the burden of accurate representation varies with each new contractual settlement made between builder and patron, some early

²⁰Salzman (1952), p.518.

sixteenth century plats taking more of a responsibility for representing their subject than others. However, as a general principle, unlike in the technical drawings of the Middle Ages, the plats made for patrons before Henry VIII tend to replicate the experience of human perspective from an oblique position, portraying a general sense of how something looks without paying too much attention to precise linear proportions.²¹

Moving chronologically onwards, during the last years of Henry VII's reign and the first years of the new King's rule, a period where Henry VIII showed little interest in building, a similar type of patron-builder relationship was maintained and similar types of images were used.²² A number of the building contracts that were produced to regulate the works at King's College Chapel Cambridge mention that a work should be made according to a plat. In fact, three of the four contracts which survive from the site use images, which is good evidence that the practice had become commonplace by the early sixteenth century. The chapel at King's was begun in 1448 and it was worked on by a succession of English kings whose reigns were cut short by civil war. By the turn of the sixteenth century it was in varying stages of incompleteness. In 1507 Henry VII provided the funds to complete the works and as his death approached he gave increasingly large sums of money to the college, stipulating that his executors should continue to finance the building until it was complete.²³

The surviving contracts from the work at King's College record that in Henry VII's final years and following his death, drawings were supplied to a set of executors who released the funds allocated by Henry VII on the understanding that the works would continue according to the plats they had seen. Two later contracts, from 1512 and 1513 both suggest that work on the chapel should be carried on "accordyng to a platt therof made and signed with the handes of the lordes executors unto the kyng of most famous memorye Herry the vij whose sowle god pardon." ²⁴ It is unlikely that the King's executors had any design input into either the roof vaults or the "Batelmentes of all the seid porches and chapelles" to which these two contracts refer. The drawings were probably used as contractual records that were valuable because they could be sent to the executors in London. Having been signed and authenticated they could be returned to the site and stored at King's college as a lasting

²¹ See John Pinto, 'Origins and Development of the Ichnographic City Plan', *Journal of the Society of Architectural Historians*, 35 (1976), pp.35-50.

²² For evidence of Henry's lack of interest in building in the early part of his reign see the opening section of chapter three.

²³ H.M. Colvin, *The History of the King's Works, Vol III* (London: HMSO, 1975), p.187-188.

²⁴ See Salzman (1952), p.567 (Contract number 110).

graphic record of what had been authorised. We know that the drawings signed by the King's executors were returned to the site and stored because a later contract makes clear that a new plat which, perhaps, altered the older set of drawings should be put "with all the other plattes afore reherced in the keypyng of the seid Surveyor signed with the handes of the lordes the kynges executors."²⁵ What we see at Kings is the beginning of a system developed in the 1540s with Whitehall as its administrative center, a system in which the plat would become both design drawing and administrative record, where from a single, central site drawings could be sent back and forth across the country to shape and change works being constructed while also allowing the collection of a graphic archive recording what designs had been authorised. The process is in its early stages during the work at Kings College for the plats here were probably not used to engage with the design of the works. It is unlikely that Henry VII's executors would have done so in any case, but we nevertheless see the innate quality of the paper plat being exploited by an administrative system at a very early date in Henry's reign. This is an important example of a theme to which we will later return.

The contracts from King's College are also useful because they give some idea of what was contained in the plats. The first mention of plats is in relation to the finials of the chapel, that is, the small conical protuberances, often highly worked, that were used to emphasise the apex of the gables used in Gothic architecture. The contract states that,

the fynyalles to be wele and workmanly wrought, made and sett upp after the best handelyng and fourme of good workmanship acordyng to the plattes conceyved and made for the same²⁶

The contract goes on to state that "All the seid fynsshying" that is all the decorative features, including the

²⁵ Salzman (1952), p.569 (Contract number)111.

²⁶Salzman (1952), p.565 (Contract number 108).

Fynyalles, ryfant, gablettes, BAtelmentes, orbys, or Crosse quaters, and euery other thyng belongyng to the same to be wele and workmanly wrought, made and sett upp, accordyng to a platt therof made, remaynyng in the kepyng of the seid Surveyour.²⁷

The plats are used as a way of qualifying the repeated assertion that the surface of the building is “to be wele and workmanly wrought, made and sett upp” a phrase which of itself was clearly thought to be insufficiently able to capture the level of workmanship expected. The later contracts use plats in a similar way. The first describes a roof vault and states that the two master masons,

the said John Wastell and Herry Smerk shall make and sett upp or cawse to be made and sett upp at their costes and charges a good suer and sufficient vawte for the grete churche ther to be workmanly wrought made and sett upp after the best handlyng and fourme of good workmanship accordyng to a platt therof made.²⁸

Once again the plat is used to illustrate what seems to be a formulaic written description that the vault should be “workmanly wrought, made and sett upp after the best handlyng and fourme of good workmanship.” The last surviving contract from the works states that in contrast to the highly worked vaults of the “great churche” that is, its nave, the “vawtes of vij Chapelles in the body of the same Church with Weldon ston to be made of a more course worke, as apperith by a platte for the same to be made.”²⁹ Here the written description of the work in the chapels is defined relatively; in contrast with the existing stonework in the nave it is to be of “more course worke.” Yet while existing work could be taken as a model, how “course” the new stonework was to be is left unclear by the written description, and as is the case with all the contracts from King’s, the burden of the information about the decorative surfaces of the stonework clearly lay within the “platte” made to accompany the contract.

The plats were probably not used as a way of *negotiating* either the structural or the decorative surface of the church, but were, in contrast, a passive record of the level of detail

²⁷Salzman (1952), p.565 (Contract no. 108).

²⁸Salzman (1952), p.567 (Contract no. 109).

²⁹ Salzman (1952), p.569 (Contract no. 111).

and decoration which had been authorised. Keeping an accurate record of how much decorative stonework was authorised at the planning stage had financial implications for both parties and these plats were clearly made to fulfil a precise and important function. However, these images would not have facilitated the active engagement with the structural design of the works of which there is good evidence later in Henry's reign.

The contemporary drawings made by William Vertue probably give a good idea of the kinds of drawing that were used as part of the King's College plats. Vertue specialised in the construction of fan vaulting and was responsible for the design of the vaults in the Henry VII Chapel at Westminster, at Bath Abbey and at St George's Chapel in Windsor.³⁰ During the period in which King's College Chapel was being completed Vertue was working on the roof vault of the chapel at Windsor. However, he visited the works at King's Cambridge at least four times between 1507-1512 and was present at a discussion in 1507 after which work was begun so it is likely that he had some influence over the design of King's and may even have drafted some of the earliest plats mentioned in later contracts.³¹ A surviving contract from St George's Chapel also shows that Vertue used plats in a similar way to the examples at King's. The relevant part of the contract from St George's states,

The said William Vertue covenanteth and granteth by these presents to cause or doo to be vaulted with freestone the roof of our Ladie Chapel within the Collegiate church of Windsor aforesaid according to a platte designed and drawn for that purpose the counterpaine whereof is and remayneth in the hands of the said Dean and Channons.³²

Like the contracts made at King's College, Vertue's contract uses a plat to record the level of work that has been agreed for, in this instance, the vault of the Lady Chapel, which is to be made "according to a platte designed and drawn for that purpose." The extant drawings that have been attributed to Vertue cannot, unfortunately, be connected to the contract cited above but they do clearly emphasise the decorative details of the stone surfaces of their

³⁰On Vertue's life see: John H. Harvey and Arthur Oswald, *English Medieval Architects: A biographical dictionary down to 1550*, 2nd edn. (Gloucester: Alan Sutton, 1987).

³¹Colvin (1975), p.188; see also Salzman (1952), p.569 (Contract number)111. For the reference to a set of earlier contracts.

³² Salzman (1952), p.562 (Contract no. 106).

subject, and the style of their drawing could have allowed plats to be used in the way the contract suggests. It is therefore likely that Vertue would have used a similar style to create the plats that accompanied the contract from St George's Chapel. Throughout this period there are problems surrounding the lack of surviving drawings. However, given the similarities between how the St George's and King's College contracts use plats as an integral part of the written agreement, and Vertue's involvement with the works at King's college, it is likely that the extant drawings attributed to Vertue provide some insight into the kinds of plats that were made for the works at King's Cambridge.

There are four surviving Gothic elevations produced during this period, one is actually of King's College Cambridge but is thought to have been made after the work was complete³³ and the other three have all been variously attributed to Vertue; two on relatively firm historical grounds and the third stylistically. The three drawings³⁴ are:

Fig 42. A bay of Bishop Fox's chantry in Winchester Cathedral, erected sometime between 1513 and 1518³⁵

Fig 43. A pedestal for sculpture surmounted by an elaborate free-standing canopy with unknown subject or origins. This image is particularly interesting in that it is the only English example of a Gothic architectural drawing which contains both the elevation and plan of its subject.³⁶

Fig 44. A proposal for a sepulchral monument to Henry VI, presumably made for Henry VII, who had planned to erect a shrine over his Uncle's relics at Westminster abbey.³⁷

³³Colvin (1975), p.195.

³⁴On all three drawings see: Richard Marks and Paul Williamson (2003); Anthony Gerbino and Stephen Johnston, *Compass and Rule: Architecture as Mathematical Practice 1500-1750* (New Haven, Conn.: Yale University Press, 2009), p.28-30.

³⁵Philip Lindley, 'The Sculptural Programme of Bishop Fox's Chantry chapel', in *Gothic to the Renaissance: Essays on sculpture in England* (Stamford: Paul Watkins, 1995), p.207-212.

³⁶On the use of elevation and plan see: Wolfgang Lefevre, 'The Emergence of Combined Orthographic Projections', in *Picturing Machines 1400-1700*, ed. by Wolfgang Lefevre (Cambridge, MA: MIT Press, 2004), p.209-244; *Gothic Design Techniques: The Fifteenth Century Design Booklets of Mathes Roriczer and Hanns Schuttermayer*, ed. by Lon Shelby (Carbondale, IL: Southern Illinois UP, 1977).

³⁷Philip Lindley, '"The Singular Meditations and Prayers of All the Holy Companies of Heaven" Sculptural Functions and Forms in Henry VII's Chapel', in *Westminster Abbey: The Lady Chapel of Henry VII*, ed. Tim Tatton-Brown and Richard Mortimer (Woodbridge: Boydell Press, 2003), pp.259-93.

Like the drawing of the timber framed house found in Worcester, these images are pictorial representations. Two of the subjects portrayed in these drawings have not survived, or were never made, however the chantry in Winchester cathedral was built between 1513 and 1518³⁸ and as Mark Girouard notes there are extensive proportional differences between the drawing and the executed building.³⁹ As is likely to be the case for all three drawings, the portrayal of the chantry gives a good impression of the extent and complexity of the surface mouldings of the chantry, but it does not portray the dimensions of its subject using a fixed numerical ratio. Moreover, the efforts towards scale drawing are undermined by the use of more than one perspective position. In fig 42 this effect is noticeable where we see both the floors of the lower niches but also look up into their canopy. Arnold Pacey describes this distorting effect in relation to the timber frame house, but the passage applies well to the range of pictorial work from this period. He writes that

to make a scale drawing, a draughtsman not only needs a clear idea that everything in the drawing is reduced in the same proportion, but also requires an awareness that any protruding parts of an elevation, and any surfaces seen obliquely, cannot be shown as they ordinarily appear. Instead, a convention known as orthogonal projection needs to be used in which everything is drawn as if seen from exactly right angles to the plane of the picture. This has the effect of compressing the third dimension of the object being drawn, which preserved dimensional accuracy where perspective distorts it.⁴⁰

Pacey draws our attention to the fact that, in order to be used as a working drawing, technical images need to avoid replicating the perspective effects of seeing receding surfaces in the real world because the experience of perspective distorts dimensional accuracy. The working drawings used by masons to lay out groundplans, or draw the full scale images on tracing floors, do take up a consistent plan view of their subject, but the pictorial work produced for patrons in this period does not use the technical idiom because, presumably, they were intended as a way of replicating how work will look for an untrained

³⁸ Angela Smith, 'The Chantry Chapel of Bishop Fox', *Winchester Cathedral Record*, 57 (1988), p.27-32.

³⁹ Mark Girouard, 'Three Gothic drawings in the Smithson Collection', *Journal of the Royal Institute of British Architects*, 64, no.I (1956), p.56-7.

⁴⁰ Pacey (2007), p.29.

patron. We see a similar use of perspective view in the joints between the superstructure and the octagonal buttress-posts in the representation of the tomb, (fig 44) where the draughtsman has improvised a perspective view and inset it into a flat elevation. However, though it is important to clarify the differences between the mason's technical and the pictorial modes of representation, we should not look at these early drawings for patrons as unsuccessful attempts at technical drawing. Pictorial images made for patrons fulfilled their function perfectly by portraying, in the case of King's College, the decorative detail which the clerks were forced to standardise into conventional written descriptions, notably that the surface decoration be "wele and workmanly wrought."

When looking at early pictorial drawings we should not think about them as failed attempts to represent their subject within a technical idiom, but as images that responded to contemporary needs which, in the above examples, concerned the level of carving work that was to be put into the surface of the stones. In Mathew Paris' account of the building of the abbey at St Albans in the *Gesta Abbatum* we can see the importance of agreeing the extent of decoration prior to work being begun. The extract describes the building work made in 1195:

It came about by the treacherous advice of the said Hugh that the carved work was added; and before the middle of the work had risen as high as the water table the abbot was tired of it [...] and the work languished. And as the walls were left uncovered during the rainy season the stones, which were very soft, broke into little bits, and the wall, like the fallen and ruinous stonework, with its columns, cases and capitals, slipped and fell by its own weight; so that the wreck of images and flowers was a cause of smiles and laughter to those that saw it.⁴¹

This passage foregrounds how, in an age of Gothic architecture, the crucial points in the design and planning process may have been utterly different to our own. Adding detailed "carved work" of "images and flowers" was not simply a decorative extra but something that could govern the success of a project. The level of work put into the stone surfaces is exactly

⁴¹ Extract from Mathew Paris, *Gesta Abbatum Monasterii Sancti Albani*, trans. by Henry Riley (London : Longmans, Green, Reader, and Dyer, 1867-1869), p.219. Large sections of the text are reproduced by Salzman (1952), Appendix A, p.376.

what the plats from King's College and St George's Windsor aimed to clarify and while the dimensions and groundplan of a site were important, and continued to be important, the level of superficial detail agreed between the patron and the builder was clearly a critical early design issue for which a clarity of communication and record was needed. By the late fifteenth century it seems that masons drawing up contracts had standardised the written descriptions of decorative detail and instead used plats to depict the agreed level of work, so avoiding the kinds of difficulties described by Paris in a period in which there is no evidence that preliminary drawings were made for patrons.

One further late example of the process of negotiating the design of a works is useful in so far as it shows how negotiating a design was context specific, depending on both the graphic and written knowledge of both patron and builder. Written in 1494 it is sent from the Prior of Canterbury to the Archbishop. The Prior writes,

... I have communed with John Wastell your mason, berer hereof, to perceyve of hym what forme and shappe he will kepe in reysyng up of the pynaclys of your new towre here. He drew unto us ij patrons of hem. The on was with doble fineall withoute croketts, and the other was with croketts and single fineall. Thys ij patrons please yt your gode Grauce to commaunde the seyd Jo. Wastell to draw and shew hem unto you, and uppon the syght your good Grace shew hym your advise and pleasure whyche of them ij, or of any other to be divised, shall contente your gode Lordshyp to be appoynted.⁴²

It is significant that the Prior asks the Archbishop to make Wastell "draw and shew" him the images, or perhaps more accurately, to *redraw* and show him how the finial will look. Presumably the drawing first made for the Prior could not simply be taken to the Archbishop because the expense of paper or parchment meant that the drawings were sketched on something like a wall or the floor, not in any case, a mobile surface. This might well explain the scarcity of pictorial drawings made for patrons. Nevertheless, the superficial design of something as seemingly minor as a finial was clearly of some importance to the two men financing the work, and the untrained Prior and the Archbishop are able to communicate the

⁴²Cited in Shelby (1967), p.390.

designs using technical descriptive language: note for example the comparison of the “doble fineall withoute croketts” and the other with “croketts and single fineall.” As in the other examples cost was probably a decisive factor in carefully examining the extent of the worked detail agreed for the superstructure of a building.

More generally, we can see how the balance between words and image is carefully and uniquely poised in each encounter between patron and builder, or one patron and another, in order to capture the design quality or complexity of a work. Unlike in the contracts from King’s where description of the details of the decorative surface are described with very limited vocabulary, in this case, two patrons, the Prior and the Archbishop are able to communicate the essential features of a design linguistically and compare two designs through their written descriptors. However, the Prior is nevertheless insistent on the use of having Wastell re-draw out and so “shew” the prelate how the two fineals will look. The extant evidence suggests that the drawings made for patrons were pictorial, but these images were of varying types and the burden of representing the work at a preliminary stage was shared between written and graphic descriptions in ways that clearly depended on the technical expertise of both the master mason and the patron. The plat was a method of communicating a design between two parties and it varied according to the graphic skills of both sides of the relationship.

At the point of Henry’s accession in 1507 there were a number of different forms of architectural drawing in regular use among master masons. There were the technical groundplans which were used to explore the proportions of the whole building in full-scale on the ground, and the full-scale images used to control the making of parts of the building that were incised into the tracing floor. There were also small-scale drawings made either as rough sketches or more formally, using the non-numerical techniques of constructive geometry. This chapter has added to this list, arguing that separate from this tradition were the pictorial drawings and carvings used to decorate the surface of stonework, and the pictorial images drawn as part of a contract with a patron. These drawings used inconsistent scales but acted as a visual record of the agreed level of detail put into the surface of stones as well as providing patrons with a view of the general appearance of a building. These two traditions seem to have been largely separate. I am not suggesting that patrons were never shown working drawings laid out on the earth or the tracing floor, and likewise, drawings for

patrons may have acted as the loosest kinds of guide in the construction of a works But these two traditions use importantly different graphic styles which reflect the fact that they were both used for precise functions and were drawn out in ways that would best fulfil the function for which they were intended. The next chapter will develop this argument in suggesting that the older tradition of technical drawing is incorporated gradually into drawings for patrons in the 1530s.

Over the course of Henry VIII's reign there is an increasing use of drawings in the process of designing domestic and military architecture and calculating how to place these buildings within their surrounding landscape But even at the end of Henry's reign the use of drawings was only part of the process through which a design was finalised. Sending drawings of landscape or architecture to the King often involved sending the mason who had drawn them to Henry, and these masons were used to explain the plat as well as used to draft any changes. The discussions themselves were often further guided by letters written by the local military commander and sent with the mason and the plats. On his return the mason and the Kings letters again accompanied any changes to the original plats or any new work which had been drafted in consultation with the King. (See chapter four for more detail) Over the course of Henry's reign, the balance between word and image shifts its weight, it does not fall decisively one way or another.

Chapter Three. Henry's patronage 1509-1539.

The following two chapters examine the relationship between the way in which maps were used, and the changing forms of graphic representation within the maps themselves. They argue that under pressure from particularly Henry VIII, the plats made for the King begin to incorporate the technical idiom which had previously been used in full scale working drawings rather than the paper plans made for patrons. Chapters three and four divide Henry's reign into two periods. Chapter three looks at the King's use of plats from his accession in 1509 to the point at which the King authorises a national re-fortification programme in 1539.¹ The period between the re-fortification programme of 1539 and Henry's death is discussed in chapter four. This division is structured around the changing extent of the archival evidence available (which is far greater after 1539) rather than being used to suggest that the history of local maps is discontinuous over the two periods. After 1539 the King's involvement with a variety of maps and plans is well recorded in the letters sent between London and the military building works across the south coast of England and the territories in the pale of Calais. Alongside the letters which record these often technically detailed conversations, some of the plats which were sent back and forth between the King and his workmen have themselves survived. These letters and plats provide evidence which shows the King altering and amending the plats sent to him for approval and clearly demonstrates that by the 1540s the King is regularly using plats to control the process of both architectural work and, in some instances, landscape mapping.² The use of maps and plans after 1539 has been examined by historians within architectural and cartographic history, and some critics have focused on Henry VIII's role within this nationwide scheme.³ Given the extensive evidence that exists from 1539 onwards, the critical works that look at Henry's influence tend to assume that the demands of the

¹ On the national refortification program see: Peter Barber, 'Map Making in England ca.1470-1650', in *The History of Cartography: Cartography in the European Renaissance, Vol. 3, Part 2*, ed. by David Woodward (Chicago: University of Chicago Press, 2007), pp.1589-1669 (p.1601-1607); J.R. Hale, 'Tudor Fortifications: The Defense of the Realm 1485- 1558', in *The History of the King's Works Vol. IV 1485- 1660 Part II*, ed. by H.M. Colvin (HMSO: London, 1982), pp.367-401.

² See: Chapter four.

³ See: Barber (2007), p.1601-1607; Hale (1982), pp.367-401; Anthony Gerbino and Stephen Johnston *Compass and Rule; Architecture as Mathematical Practice 1500-1750* (New Haven, Conn.; London: Yale University Press, 2009), p.31-44; *Man and Monarch*, ed. by Susan Doran and David Starkey (London: The British Library, 2009), p.209-257.

fortification programme and the use of foreign engineers caused the kinds of changes associated with this period, notably the introduction of scale, and the inclusion of the King within the process of designing the royal works.⁴

However, chapter three argues that local maps incorporated the technical idiom during the design of Henry's domestic palaces in the early 1530s, nearly ten years before the fortification programme was begun. Rather than focusing on the demands of the fortification programme and its influence over the local map, my own work looks at the graphic skills of the master masons and the personal and political demands of Henry VIII and suggests that the interaction between the King and his master masons leads to the use of technical drawings within the negotiations between patron and builder over domestic works. A two way process is described: on the one hand, Henry's demands for increasingly intricate and extensive privy apartments in the early 1530s were enabled by the small-scale, technical drawings being made for the King. On the other, the King's demands themselves encouraged masons to incorporate the technical idiom into small-scale plans as a way of satisfying the King and working through his increasingly complex architectural demands.

This argument connects my work to a critical tradition that focused around the work of David Starkey that has, up to now, been separated out from cartographic studies of the period. Starkey's argument suggests that Henry had personal and political reasons to control the design of his domestic apartments in the 1530s. He has argued that the rooms around the King were used to establish a hierarchy of political power by regulating access to and intimacy with the King.⁵ By emphasising that political power focused around access to Henry VIII himself, Starkey invites closer attention to the physical rooms and chambers of the royal apartments and these architectural features become part of a complex history of how

⁴ See esp. Gerbino and Johnson (2009), p.31-44; See: Barber (2007), p.1607; Marcus Merriman, 'Italian Military Engineers in England in the 1540s' in *English Map making 1500-1650*, ed. By Sarah Tyacke, (London; British Library, 1983); R.A. Skelton, 'The Military Surveyors Contribution to British Cartography in the 16th Century', *Imago Mundi*, XXIV (1970), pp.77-83; P.D.A. Harvey, 'The Portsmouth Map of 1545 and the Introduction of Scale Maps into England', in *Hampshire Studies*, ed. by John Webb, Nigel Yates, and Sarah E. Peacock (Portsmouth: Portsmouth City Records Office, 1981), pp.33-49.

⁵ Starkey's articles on the subject are extensive but see esp. David Starkey, 'Introduction: Court History in Perspective', in *The English Court: from the Wars of the Roses to the Civil War*, ed. by David Starkey (London, 1987), pp.1-24; 'Intimacy and Innovation: the Rise of the Privy Chamber, 1485-1547' in Starkey (1987), pp.71-118; 'Court and Government', in *Revolution Reassessed: Revisions in the History of Tudor Government and Administration*, ed. Christopher Coleman and David Starkey (Oxford, 1986), pp.29-58; see also: Simon Thurley *The Royal Palaces of Tudor England : Architecture and Court Life, 1460-1547* (New Haven, Conn.: Yale University Press, 1993), p.36-39.

political power was given to those allowed beyond certain key doorways and removed from others by keeping their access limited to outer chambers.⁶ Yet given how important the layout and design of the King's apartments are to Starkey's argument, it is perhaps surprising that he does not openly confront the issue of whether or not Henry designed his own privy chambers or was personally responsible for the continual expansion and re-working of these rooms in light of the changing political circumstances of his reign. That Henry had some influence over the works is implicit in much of Starkey's writing, yet the precise nature of his involvement is never clarified, as in the following passage from his introduction to a collection of essays on the English court. In this passage Starkey responds to Geoffrey Elton's argument that there was a separation between the royal court and the process of national government that Elton describes as both "institutional and geographical."⁷ Starkey disagrees with Elton's argument writing that,

The king's court was the government: the king's palace – Whitehall – was the seat of government. [...]. For not only had Henry VIII acquired and rebuilt the palace; he had remodelled both Council and Chamber. And all at more or less the same time, between 1526 and 1540. This is the true 'Tudor revolution in government' it did not depersonalize government, as Elton thought. Instead it focused if more directly on the King's person and his palace.⁸

Starkey here connects the act of rebuilding the palace with the remodelling of the institutions that it would house, but it is unclear how much agency Starkey would actually give the King. Despite his assertion that "Henry VIII acquired and rebuilt the palace" and that "he had remodelled both Council and Chamber," Starkey could be suggesting that the King

⁶ In a characteristic passage Starkey explains the relationship between the Privy Chamber (the group of nobleman who waited on the King in his day to day life within his most intimate rooms, including the bedchamber) and the Privy Council (the nobles who formed the principal decision making body in England, and who were often also members of the Privy chamber) through looking at the layout of the rooms at Whitehall. He writes: "The doors of the Council Chamber and Bedchamber were thus separated by only a few yards of the width of the Gallery. This proximity explains, almost by itself, the close links of the Privy Chamber and the Privy Council. They co-habited the same exclusive area of the palace to which, moreover, only they had access. [...] they were specialist but overlapping bodies that both drew their power from their proximity to the monarch." Starkey (1987), p.16. Starkey's approach consistently emphasises the point contained in the above passage: that understanding how Tudor institutions separated and overlapped relies on a knowledge of the rooms which structured the political hierarchy.

⁷ Starkey (1987), p.17.

⁸ Starkey (1987), p.17.

himself re-designed both palace and institutions or could be using “Henry VIII” as a synecdoche to suggest that Henry and all of his councillors, masons, workmen etc. were responsible. Yet if Starkey’s work neglects the archival details that might help us to re-construct how far Henry’s own influence can be felt behind the design of his palaces, his work is important in so far as it offers a clear motivation for why Henry might have become involved with the work of his masons during the extensive building and re-building of his palaces in the 1530s. For as Starkey convincingly argues, the design of the King’s palaces had personal and political importance to Henry. In a system where designing the spatial organisation of the King’s palaces was a way for the King to control the various institutions and men housed within them, control over architectural design was in effect a method of manipulating the governing bodies in England. Starkey’s arguments invite a materialist examination that does not simply assume that design control over architectural works was possible, but looks at the forms of representation being used and questions how far any lay patron could have shaped the work of master masons. This chapter looks at evidence that shows the technical idiom being incorporated into the drawings made for the King. It suggests that the kinds of personal and political motivations that Starkey describes led to increasing pressure on master masons to abandon the pictorial works made for patrons during an earlier period and make drawings that would more accurately represent their subject within a set of standardised drawing conventions and allow Henry an increasingly active part in designing his buildings.

Simon Thurley’s work on Tudor palaces also provides a useful context to this chapter. Thurley argues that between 1529 and 1531 there was a fundamental shift in royal interest in the King’s works and in the style of the architecture being made. Examining the buildings at Hampton Court, he argues that up to 1529 Henry continued to live in works built under the supervision of Cardinal Wolsey and that, even after Wolsey’s downfall, Henry extended the royal apartments in the style of Wolsey and Henry VII, that is, by building upwards and creating a tower, known as a donjon, where the most private apartments were reached by going higher up the structure.⁹ However, Thurley argues that between 1529 and 1531 the King began to exercise his influence over the design of his works, evidence for which can, he suggests, be seen in the abandonment of this medieval style of royal apartment. For by April

⁹ Simon Thurley, *The Royal Palaces of Tudor England : Architecture and Court life, 1460-1547* (New Haven, Conn.: Yale University Press, 1993), p.52.

1531 the foundations for Whitehall were being dug and the new style of palace seen at this site extended not upwards, where space was limited, but outward, on a single level, in a network of privy chambers, galleries, courtyards and gardens to which access could be limited to the men of the Privy Chamber by guarding a few principal entry points.¹⁰ Thurley incorporates Starkey's arguments into his own architectural research, arguing that "The revolutionary change in the design of Henry VIII's innermost lodgings between 1529 and 1531 is linked directly with changes in the organisation of [...] the King's Privy Chamber."¹¹ As Starkey suggests "rebuilding" Whitehall Palace was a way of "remodelling" the Privy Council and Chamber, architectural re-design being part of the way in which the King shaped political institutions. Yet if Thurley provides a chronology that focuses attention on the architectural work of the early 1530s, his research does not explain how the King might have been able to implement design changes within the politically important spaces he inhabited. My own work looks at documentary and graphic sources and evaluates the material evidence of Henry's involvement with his works as well as considering whether the drawings being made would have allowed Henry the kind of design control described by both Starkey and Thurley.

Despite the confidence of both Thurley and Starkey that it was possible for Henry VIII, or indeed any patron, to exercise control over the design process in the early 1530s, the documentary evidence of Henry's involvement is limited and architectural drawings from the period are scarce. From the early 1530s, the financial accounts of the King's works begin to record both the purchase of materials to make plats for the King and the travelling expenses of masons travelling back to Henry with these drawings. Though these references are important in showing the King's early involvement they are accounting documents made up to record financial expenditure and in so far as they provide narrative descriptions of events they do so solely to explain how various sums of money were spent. Consequently these works accounts offer limited details about how exactly the King used his plats. As I have suggested above, this situation changes after 1539 because the King's military fortification programme is well recorded in letters that provide extensive and detailed descriptions of Henry's plat use. Similarly, plats seem to have been collated and stored in Whitehall after

¹⁰Simon Thurley, *Whitehall Palace : an Architectural History of the Royal Apartments, 1240-1698* (New Haven: Yale University Press, 1999); Thurley (1993), esp. p.55.

¹¹Thurley (1993), p.135/136.

1539 in a way that they were not in an earlier period and only one of the plats drawn by a master craftsman between 1529-1539 survives. We know that plats were made in the early 1530s from the financial accounts that record the purchase of their material and their use by the King, but for some reason these images were not stored in the same way as the plats of military works made after 1539. The limited number of pre-1539 drawings that are available to a modern historian do not therefore reflect historical reality and, apart from one select example, the drawings discussed in textual sources have been lost.

Chapter three begins by examining the documentary evidence of Henry's involvement with his domestic works. Having looked at this documentary evidence of plat use during the early 1530s and having attempted to evaluate Henry's involvement with the design process my work then turns to examine what kinds of drawing were being used. Only one drawing of the King's domestic building work has survived from this period. Made in 1534, this parchment plan of royal apartments in Calais was drawn in the technical mode which was, I have argued, characteristic of masonic working drawings made between the 1190s and the 1550s. It provides unique evidence that the graphic techniques used in medieval working drawings were incorporated into small-scale paper plats used by patrons to examine the design of architectural works. Unfortunately the drawing cannot be connected to the named masons that we know were regularly making drawings for the King throughout the 1530s and it cannot therefore be taken as an example of the graphic work of the King's favourites, notably William Clement and Christopher Dickenson at Hampton Court and John Moulton and John Russel in Whitehall.¹²

Though the early graphic work of these craftsmen has not survived, some of their work on military sites made immediately after 1539 has been found and these plats are analysed to give us some idea of the kinds of plats that were being made for the crown during an earlier period. Despite the limited evidence available this chapter concludes that Henry was using architectural plats during the early 1530s and suggests that the technical idiom was being used in plats from at least 1534 and probably earlier. My argument suggests that the pictorial drawings which were made for patrons in the late fifteenth and early sixteenth century were unable to portray the increasingly complex architectural demands of Henry VIII in the 1530s and, under pressure from the King, masons began to make technical

¹² See part i of this chapter for more details about the work of these men..

working drawings on paper and at small scale for the first time. The work of Starkey and Thurley draws our attention to the fact that Henry may have wished to control the layout of his palaces because these domestic spaces were intimately involved with the management of England's most powerful political institutions.

i. The Documentary Evidence of Henry's Architectural Involvement During the 1530s

In the early years of Henry VIII's reign the King seems to have taken relatively little interest in the domestic building works financed by the crown. Thomas Wolsey managed this aspect of royal expenditure, and there is evidence of the King's influence at only one of the five sites at which royal works were begun before Wolsey's downfall in 1529. The largest of the King's works were made at Bridewell and Beaulieu and at both these sites the principal master craftsmen were chosen from Wolsey's own works staff at Hampton Court or other personal building projects, and the financial records show that Wolsey seems to have largely negotiated the on-site details.¹³ At Eltham, the conversion works undertaken from 1519 to 1522 were managed by the King's comptroller, but the few extant paper records surviving from the site suggest that Wolsey once again managed the details.¹⁴ Henry himself draws negative attention to Wolsey's control of the King's works. During Wolsey's disgrace and downfall a list of Wolsey's prodigal and wasteful expenses was drawn up and with particular reference to the temporary palace made for the Field of Cloth of Gold, which was one of the major architectural works of the King's early reign, the Cardinal was accused of 'prodigal dispensing of the king's treasure.'¹⁵ Only at Greenwich can the King's early works not be connected to Wolsey's supervision in so far as the design of two towers joined by a double storey gallery which ran around the tiltyard (and allowed maximum viewing space) probably reflected the King's personal interest in tilting, hunting and revelling.¹⁶

The extant documentary evidence for the King's involvement after 1529 is framed by some scattered anecdotal references to his interest in the design of his works. In 1531 the Milanese ambassador, reporting the purchase of the lands for Whitehall Palace stated 'his majesty is now staying at Greenwich, and often comes to Westminster, having designed

¹³ Thurley (1993), p.40-45.

¹⁴ Thurley (1993), p.45-46.

¹⁵ Thurley (1993), p.48.

¹⁶ Thurley (1993), p.48.

[designato] new lodgings there.¹⁷ The King's early interest in his works is similarly implicit in an anecdotal detail mentioned in 1532 by the French envoy Du Bellay who, writing to Francis I, stated that that whenever they came to any house of the King's 'he shows it to me and tells me what he has done, and what he is going to do.' The details about the King's involvement contained in the financial records of the works accounts compliment these descriptions. His two largest-scale building projects during this period were at Whitehall and Hampton Court. At Whitehall, the accounts from 1531, the commencement of the King's works there, show that William Bayly, a London stationer, was paid for 'ijj skunnes of vealomne delyvered at the kinge's manor to the handes of the maister mason there for plattis to be drawn upon the concernyng the saide buyldings.' Similarly, 'Paper Royall' was purchased for use by the master mason, the master carpenter and others and on 8th September and on the 4th October paper was again delivered to the master mason for 'for drawing in his Tracerye howse.'¹⁸ The accounts of the purchase of paper at Whitehall do not record whether these plats were shown to the King, perhaps because unlike the works made further afield, the plats at Whitehall were made in such close proximity to the King that his involvement was not recorded, and travelling costs incurred through taking plats to the King were not claimed. The plats made further from Whitehall, at Hampton Court give more detailed evidence of the King ordering and using plats. As early as the summer of 1529 the financial accounts from Hampton Court record that joiners were,

'working by the king's devyese in his prevey closett over the wardrobe uppon all suche prevey conceyts wiche wer devysed ther by his grace.'¹⁹

This entry suggests two possibilities: either the craftsmen were working *with* the King in his privy closet on a set of designs or "conceyts" for the building site as a whole, or they were working "by the kings devyese" on the actual construction of the closet using the designs which were "devysed ther by his grace." Both possibilities suggest that before 1529 Henry had been involved in working on a plan that could be followed by his joiners during the construction process. Henry was also involved with the design of the new great hall whose

¹⁷Thurley (1993) p.39.

¹⁸Colvin (1975), p.40, n.13.

¹⁹Colvin (1982), p.5.

foundations were laid in 1532. The design of this building was prefaced by the purchase of six skins of parchment and four of vellum 'to draw sundry plots upon at the King's grace's commandment.' In May 1531 the Master Mason and Master Carpenter of the works: William Clement and Christopher Dickenson, were again being paid to work in their "tracing howses," and during this period paper was bought using a similar explanation: for "sundry plattes drawyn at the Kynges commandment."²⁰ It is possible that Henry developed a personal relationship with Clement and Dickenson during the period in which they were drawing plats of Hampton Court "at the Kynges commandment" for the two men were transferred as a pair from Hampton Court to design the King's brand new palaces at Oatlands and Nonsuch and regularly travelled to the King with plats of these works.

Unfortunately none of the plats made by these craftsmen survive, however there are numerous references to their drawings. In 1537, Dickenson claimed 'for hys rydyng costes to the Kynges grace with sondry plats' of Oatlands as well as "to Knoll Otforde and other sondry places for provisyon of stone and workmen"²¹ and this entry marks the start of what seems to have been a circuit between Hampton Court, Oatlands and Nonsuch which provided the King with a series of updated plats of the works and organised the provision of materials from the surrounding countryside. In 1538 the first indication of the works at Nonsuch begin with the purchase of a ream 'of paper royal of the largest sort' and a large quantity of parchment for Clement and Dickenson to draw 'platts.' The following month riding expenses are claimed for Clement and Dickenson who rode to the king at Greenwich with 'platts' while using the return journey to visit various sites for the provision of materials.²² Similarly, in the next pay, after the start of works at Nonsuch, the two men again charge for riding to the king at Greenwich with 'platts' and also to Oatlands 'at sundry times to set out work to the workmen' and each month thereafter Clement and Dickinson were paid their riding charges of 12d. a day each for the ten days or so they spent travelling on Nonsuch business.²³

These documentary references suggest that Henry certainly had regular involvement with plats during the design of Nonsuch and Oatlands. Furthermore, Clement and Dickenson, the craftsmen making the drawings at these sites, were also employed to make

²⁰Colvin (1982), p.133.

²¹Colvin (1982), p.208.

²²Colvin (1982), p.181.

²³Colvin (1982), p.181.

plats of the works at Hampton Court “at the Kynges commandment” from as early as May 1531. While we know that plats were made of Whitehall, the financial accounts do not record that they were made on the orders of the King, or that they were shown to Henry. However, given Thurley’s argument that Whitehall marked a radical design change in the style of royal apartments, alongside a remodelling of the Privy Chamber, it is possible that the plats were shown to the King but that the scribe drawing up the works accounts recorded the purchase of the paper, not its use, as seems to have occurred in the more certain references to the King’s involvement at Hampton Court. Given these difficulties in the source material, (and it should probably be noted that only sections of the works accounts from both Hampton Court and Whitehall have survived), the documentary references do show the Kings involvement with drawings from at least May 1531. Unfortunately, the short descriptions used within the accounting books to explain various amounts of expenditure do not leave a clear impression of how plats were being used by the King. In answer to this question, and in response to Starkey and Thurley’s conviction that patrons were able to control the design of their works, this chapter now moves on to examine what kinds of drawings were being made for the King during this period and questions what the incorporation of the technical idiom into small scale work for patrons can tell us about how plats were being used by Henry and his craftsmen.

ii. The Drawings Made for Henry between 1529 and 1539.

The documentary evidence suggests that two men in particular, William Clement and Christopher Dickenson worked on a monthly circuit around the honour of Hampton Court taking plats to the king, helping with the setting out of new work at various sites, and organising the supply of materials. None of the plats they made of the King’s domestic works survive. However, when Henry starts a nationwide fortification programme in 1539, Clement and Dickenson are placed in charge of a series of three forts to be newly built on the Kent Coast at Walmer, Sandown and Deal from which sites three drawings have survived. Not only Clement and Dickenson but the whole works team is drawn from Hampton Court to run the construction of the new fortifications: the paymaster Richard Lorde, the Surveyor Richard

Benese and the Comptroller David Marten.²⁴ Despite there being no evidence that these men had any military experience, or, indeed any experience of military architecture, the use of craftsmen trained to construct domestic architecture in the 1539 fortification programme was not unusual.²⁵ The plats made by Clement and Dickenson of the castles at Deal, Sandown and Walmer were likely to have been made between February 1539 (when the device which began the re-fortification programme and first named the castles was drawn up) and April 1539, when work on the castles was begun. Only a few months before this date, we know that Clement and Dickenson were involved in making a series of plats of Nonsuch and Oatlands, and the drawings of the castles on the Kent coast therefore gives us some of the best evidence of the kinds of image being shown to the King by Clement and Dickenson in the 1530s.

Two of the drawings, Fig 45 and Fig 46, are roughly similar in style. Fig 45 is a bird's eye view of either of the two identical castles at Walmer and Sandown. It is a coloured drawing that uses dark browns and blacks to represent its woodwork and the firing canon, and the draughtsman has surrounded the fortification in a deep green landscape which is carefully lightened as it approaches the walls to help emphasise the central image. This choice of dark pigmentation balances the representation of the fortification itself which uses heavy shading to emphasise the three dimensional shapes of the circular bastions and helps to set the fortification solidly into a landscape. This effect of the colouring of the image is largely dramatic, portraying a powerful and decidedly threatening structure. The draughtsman is clearly not particularly concerned about the accurate representation of the proportions of his subject, for the actual castles of Walmer and Sandown were built using four circular bastions of the same size (see the plan from 1725, fig. 47), but the perspective view chosen by the draughtsmen leads to odd distortions of the bastions. Unlike the bastion at the front of the image and the rear bastion partly hidden behind the central keep, the two side bastions have not been elongated in accordance with the receding perspective. To our

²⁴ Colvin (1982), p.455. The issue of the design of these works is slightly confused by the presence on site of a German artist, cartographer and engineer called Stephen von Haschenperg, described as 'surveyor of the four bulwarks upon the Downs otherwise called Devysorof the Woorkes ther.' However Colvin convincingly argues that the "four Bulwarks" for which von Haschenperg seems to have been responsible were four earthen Bulwarks which, from later accounts, we know were constructed between the stone works as a way of connecting the three large forts in a single defensive line along the coast. See Colvin (1982), p.457, for more details.

²⁵See Colvin (1975), p.42.

eyes, which are used to a consistent perspective in drawing, this effect suggests that the two side bastions are smaller or of a different shape to the ones at the front and rear but the 1725 plan (fig 47) makes it clear that the bastions were in fact all the same size. We need not necessarily put this down to a misunderstanding of perspective, which is skilfully rendered for the front and rear bastions. Nor is this simply a failed attempt at technical drawing. As with the Vertue drawings of Gothic elevations, it is important bear in mind that this drawing probably successfully fulfilled the function for which it was created. We can sense that the effort behind the drawing has gone towards exciting the dramatic interest of the viewer and to encourage them to grasp the solidity and power of its subject and it seems reasonable to assume that it was used for just this purpose, being shown to Henry VIII as only a rough guide to the proportions of the work being planned. It could not have been used to construct the works in any but the loosest sense, for it distorts dimensions and curvatures of its subject inconsistently and would, of itself, offer a confusing guide to either the dimensions or shape of a work.

For a contemporary at the planning stage of the works, understanding this image would have relied on the draughtsman carefully explaining the shapes and sizes of its parts, and so weird and unique is this drawing's method of representing its subject that the drawing could not easily have been adapted or altered in a way that would have made it useful in the discussion of alternative designs. It is not only the inconsistent sizes of the drawing's various parts which create this effect, but also the rich colouring and dramatic detail of the work. There is too much material in the drawing, too much colour, shading and action (the firing canon etc.), for the drawing to be used to discuss anything other than the representation of the design it portrays. As with the drawing of the waterways around Hull considered in chapter one the viewer is forced to move around the image distinguishing different kinds of line because the relationship between the image and its subject is not consistent across the page.

Technical drawings made on the medieval tracing floor (or at Guines) use an idiom that does not crowd the image with matter than needs local explanation, nor does the technical idiom require the guidance of the draughtsmen to allow the viewer to fit the parts together into a meaningful whole. In technical drawing the subject is reduced to a set of single lines which follow its outer edgesthis leaves the drawing open to alteration, addition or re-drafting, as in the illustrative example of the corrected angle of the arch which tops the

drawing of window tracery contained in the Pepys manuscript (see fig 30) or the designs for a range of multi centred arches made on the tracing floor at York in 1525.²⁶ In contrast, the drawing of Walmer is an image which allows the discussion of a design concept in much the way that the Vertue drawings allow the discussion of decorative detail: they enable both parties to come to an agreement that is either represented in the drawing or it is not. If a new design idea is required or a different level of detail agreed upon, then a whole new drawing must be drawn. These drawings are a passive record of what had been verbally agreed or proposed and they could not easily be used as a way of probing an idea through alteration and discussion based around manipulation on the page. The drawing itself therefore postulates a specific type of usage, one that does not fit easily with the image of the King actively designing and re-designing his domestic rooms using the work produced by Clement and Dickenson. This pictorial work would have limited the King's capacity to engage with the complex suites of carefully proportioned rooms that we know were built at Whitehall or the complete re-organisation of the privy chambers at Hampton Court or the privy suites at a newly designed palace like Nonsuch. If this were the only example of Clement and Dickenson's work, Starkey and Thurley's argument that Henry was able to re-design the prevailing style of royal apartments alongside his newly organised and enlarged Privy Chamber would have to be seriously questioned.

Figure 46 portrays Deal Castle, the third and largest of the three castles in the downs and it is a similar kind of drawing. Like the drawing of Walmer, it includes a number of local details: there are figures and flags; precisely detailed wickerwork baskets; neatly stacked cannonballs and a struggling man carrying a sack. Furthermore there are local distortions of sizes and proportions: windows, doors, cannons and baskets are subject to shrinkage and enlargement which imprecisely relates to their size in the real world and this confuses our appreciation of the relative sizes of the parapets and the bastions. Yet the effect of the whole drawing is reasonably clear: it promises a tall fortification ringed with circular bastions that will be constructed to contain large numbers of cannons. However, the precise dimensions, proportions and construction details are unclear.

These two drawings are, we must remember, made by Clement and Dickenson, and as such they represent the work of draughtsmen supplying plats to Henry throughout the

²⁶ See Pacey (2007), p.129-134.

1530s. We cannot however assume that these pictorial drawings represent the kinds of work produced during their earlier positions on Henry's domestic building projects at sites like Hampton Court, Oatlands or Nonsuch. For alongside the drawing of Walmer and Deal portrayed in Figures 45 and 46 can be placed a drawing of the castle of Deal which uses the technical idiom. Fig 48 is a plan view of the castle of Deal which is also portrayed in Figure 46. Both images go to some effort to portray baskets of rubble used to protect the cannons, a feature that was replaced by stone crenulations on the actual castle, and given this unusual and characteristic feature it is likely that the two drawings were drawn by the same designer at a preliminary stage of the works and that they were made to be used side by side. Figure 48 does use pictorial features: the baskets of rubble are carefully portrayed mimetically, as are the cannons that sit between them, and the draughtsman has inked in little lines intended to represent the explosion of the cannon ball. However, aside from the military features which are represented pictorially, it is clear that the draughtsman is able to draw in a technical mode familiar from the construction drawings used in medieval domestic architecture. The body of this drawing, the part which is concerned with the stone structure of the fortification itself, is drawn in a way that clearly privileges the proportions of its subject at the expense of representing its appearance in reality. Much of the detail of the stonework building has been cut away and the lines of the drawing represent the boundaries of the walls, laying out, in the process, the relative size and placement of internal features without trying to represent their appearance mimetically. It is, in effect, this technique of abstracting an image from its appearance in reality and representing it in a way that privileges its proportions that characterises the technical idiom at use in the representation in fig 48 and which differentiates it from the pictorial plans of Deal and Walmer.

Though the masonic working drawings of the Middle Ages and the paper plat reproduced in fig 48 use a similar technical mode, fig 48 has taken technical drawing one step further. For while the lines on the Byland and Wells tracing floors represent the edges of blocks of stone, or the joints between stonework, the lines of the drawing of Deal incorporate elements like doorways and staircases into the technical representation of the groundplan without distorting the representation: in fig 48, the central spiral stair is represented by lines radiating out of an arc, and the doorways by a small indentation on either side of an opening. While either Clement or Dickenson may have drawn out the unfamiliar military features pictorially – the baskets and cannons - in terms of domestic

features, he has clearly learnt to reduce all the elements into a consistent format using a set of pre-defined graphic conventions. These conventions do not disturb the total visual effect of the work, nor do they distort its internal portions or break the consistency of the viewpoint. Doorways are represented by their absence and a slight indentation at the point at which a door is set into a wall, and stairways follow the lines of each individual stair without trying to represent the vertical drop of the open space. There is a mixture of convention and representation in the portrayal of these features, but we can see an effort towards inseting these features, structurally different from the boundary walls but nevertheless an important part of the superstructure, and minimising the effect of disruption by keeping, as far as possible, a consistent type of line throughout the image. This line reliably follows the furthest edges of a subject and consistently rejects the kinds of mimetic texturing or perspective effects that we see in the pictorial images of Deal and Walmer. Moreover, architectural features are reduced into the whole in a way that allows their rough proportions to be understood: a door is as wide as the gap between the two indentations (indentations which also neatly represent its placement within the wall and the direction in which the door will open) and a staircase is as large as the space it takes up on the plan.

In the plan of Deal, the technical idiom is incorporated into the paper plats made for patrons, plats which had previously used the pictorial style. The few pictorial features added into the image portray the military aspects of a work that would have been unfamiliar to Clement and Dickenson trained, as they were, in the representation of domestic buildings. It is also possible to probe the origins of the graphic conventions used to represent doorways and staircases in this image, for it is possible that the plan drawing of Deal could have been made using conventions that were developed in the full-scale groundplans laid out in string and cords on the surface of the earth, rather than developed for the first time on the paper page. Medieval groundplans have all been destroyed by the buildings themselves but it is likely that craftsmen far earlier than Clement and Dickenson had realised the use of reducing external features into their work using representational conventions that did not disrupt the proportions of the full-scale image. We know from the accounts detailing the purchase of materials that laying out a groundplan used a mixture of rope, cords and brightly coloured

powder like lime, and the powder could well have been used to mark in such features.²⁷ In modern architectural histories full-scale drawings on the earth are often seen as something indistinct, something that is not quite drawing and certainly not a graphic medium in which important on-paper drawing techniques were developed.²⁸ However, I am suggesting that the full-scale drawings made using stakes, cord and powder were in fact the direct antecedents of small scale paper drawings and that these full-scale images drawn on the earth were in fact the medium through which the use of a consistent technical line was appreciated and a series of graphic conventions was developed. What we see in this image is an adaptation of medieval craft skills in order to provide a patron of the sixteenth century with a working drawing that explores the dimensions and shape of its subject.

From the evidence already cited above, we know for certain that Henry was provided with drawings of Hampton Court, Oatlands and Nonsuch by Clement and Dickenson at preliminary stages of the works from as early as 1531. The technical drawing of Deal suggests that these men could have been supplying the King with the kinds of images that would have allowed Henry to engage with the design process and actively re-work the structure of his privy suites in line with the changing political demands of his reign. Though we cannot be sure at what point the drawings taken to the King began to represent his works in this way, it is possible that the lost drawings from these earlier sites were made in the technical mode by craftsmen whose first extant work shows a good grasp of the technique.

The team of Paymaster, Surveyor, Master Mason and Master Carpenter who had been organising the King's works at Whitehall, and who we know bought large quantities of paper for making plats in the early 1530s, were also given the task of supervising and inspecting several forts and it is possible that they were commissioned to review all the

²⁷ See Chapter one, part ii, subheading 'The Groundplan' for more discussion and a number of examples of the use of these materials in drawing out a groundplan.

²⁸ See For example Robert Branner, Villard de Honnecourt Reims and the origin of Gothic Drawing', *Gazette de Beaux Arts*, March (1963), pp.129-46 (p.130). This article relies on the assumption that full-scale groundplans do not constitute a form of drawing, and that images constructed at full scale using stakes and string are separate from other types of representation. As in the following passage "no matter how subtle or complex, the schemes could be worked out and the building erected from them without the intermediary of drawings.[...] Stakes, cords and simple instruments served in the layout of the plan, measuring rods were probably used for the elevation, and simple "rules of thumb" based on long masonic experience provided solutions to whatever stereotomical problems may have arisen."

south coast defences in 1539.²⁹ At Cowes, John Moulton, John Russell and Thomas Canner, the Mason, Carpenter and Paymaster of Whitehall, compiled a report of the state of the defences around the Isle of Wight but no drawings can be directly connected to their survey. The extant work on this area is more likely to have been made by Thomas Bertie,³⁰ who seems to have been left in permanent control of a number of works around Southampton Water and was eventually made the Captain of Calshot Castle. Two dramatic pictorial plans for a castle on the distinctive spit at Calshot have survived, but there is not enough evidence to connect these drawings to Moulton and Russell. This is unfortunate because this pairing of Master Mason and Master Carpenter formed the London equivalent, dealing largely with Whitehall, of the more peripatetic Clement and Dickenson, and all these men are likely to have shaped the King's use of plats in the 1530s.³¹

The single surviving drawing of Henry's domestic buildings between 1529 and 1539 is a floor plan which portrays the conversion of the internal space of the Exchequer in Calais into three separate suites of rooms for the French King, for Henry VIII and for his Queen (See fig 49 and 50). The dating of this plan is uncertain. It has been associated with the meetings around The Field of Cloth of Gold in 1520, and with negotiations in 1532. However, Colvin convincingly argues that only in the meeting planned for the summer of 1534 were Francis, Henry and his Queen all going to be present, and he suggests that the plan was made at some point during the spring of 1534.³² This places the plan squarely in the middle of the period we are examining and it is an example of a drawing made in a technical idiom familiar from the full-scale work of Middle Ages, without any of the pictorial features used to represent the military features in the 1539 plan of Deal, or the distortions of internal proportions and perspective associated with drawings for patrons in the late medieval period. The plan uses the same conventions that we see on the plan view of Deal: doors are

²⁹Colvin (1982), p.357.

³⁰Colvin (1982), p.357. Thomas Bertie was an accomplished mason in his own right, re-designing a house at Titchfield for Thomas Wriothesley.

³¹On the administrators and the works at Calshot, East and West Cowes and Hurst castle, where the King's master masons, Thomas Bertie, the Earl of Southampton and Lord St John Russell seem to have shared organisational and design responsibility see: Colvin (1982), p.527-530, 535-544. For more information on William Clement and Christopher Dickenson and their London equivalents, John Molton and John Russell see Colvin (1975) 'The Craftsmen' p.25-45; John H. Harvey and Arthur Oswald, *English Medieval Architects: A biographical dictionary down to 1550* (Gloucester: Alan Sutton, 1987), p.59(Clement), p.85(Dickenson), p.231-232(Russel), p.186-188(Moulton).

³² Colvin (1975), p.349.

marked by slight indentations into walls and spiral stairs indicated by lines radiating out from a central circle. In the plan of the Exchequer, spiral stairs are also distinguished from parallel stairs, which are marked by a series of parallel lines enclosed within a box. The drawing is a semi-scale representation; it cites dimensions at many points but the sizes of the rooms it portrays do not accurately correspond in fixed ratio to these dimensions. However, the deviation is not large and on the whole the plan gives an accurate idea of the relative sizes of the chambers and courtyards.

There are no documentary references to this plan. However, it was clearly used to work out how the internal total space of the Exchequer building could be divided up to accommodate three royals within separate sets of privy chambers. This is a complex undertaking; the plan is well over a meter square and the space is split into over sixty rooms which provide each of the three royals with, at the least, a great (or watching) chamber, dining chamber, raying chamber, bedchamber, inner (or withdrawing) chamber, stool chamber or jakes, private closet or oratory, and access to a pew in the gallery of the common chapel.³³ Colvin points out that the bedrooms of the English king and his Queen are, moreover, in close proximity, so that here, as elsewhere, the duality of the households (though it may facilitate infidelity) is not necessarily an impediment to normal married life.³⁴ This arrangement is further complicated by the fact that the rooms have to be arranged around a series of internal courtyards and are clearly bounded by the external walls of the existing building's walls, themselves irregularly shaped by the outside streets.

Given the expense of producing this large drawing, and the whole emphasis on setting out the requisite form of royal chambers and balancing the demands of the royal patrons, it is likely that it was made to show to Henry VIII. This drawing is the first surviving example of two graphic traditions crossing over: work made for patrons here uses a mode of representation which had been developed during the medieval period in the full-scale ground plan, the tracing floor drawing, and the template. Up to 1534 at the latest, there have been two separate forms of architectural drawing: firstly, the work produced alongside written contracts that recorded the style, quality, and size of a building and secondly, the technical work made by masons as a way of controlling the construction of a building on site. The 1534 drawing is likely to be the first extant example of a long tradition of architectural

³³Colvin (1982), p.14.

³⁴Colvin (1982), p.14.

drawing that uses the technical idiom to construct the drawings made to show to patrons. However, as the drawings from Deal and Walmer show, pictorial drawings do continue to be produced.

Unlike the pictorial images made for patrons the technical plan view made in 1534 would have allowed a very precise mode of interaction between the King and his craftsmen, for these plan views do not replicate the kinds of distortion we see in the pictorial images, nor do they crowd the representation with external effects and so shape a particular emotive or intellectual response. The drawing of the Exchequer would have allowed the viewer to use the image in a completely different way from the pictorial drawings presented to patrons in the past. By replicating its subject using a consistent perspective position and a set of standardised drawing conventions, images could be altered on the page or re-drafted on a separate but comparable image and a design concept explored through a number of different designs. This kind of drawing would have allowed Henry to alter existing proposals and design internal rooms that better suited his precise demands.

iii. Why Might Master Masons Have Chosen to Draw in the Technical Mode in the 1530s?

The two earliest examples of technical drawings made on paper, the plat of Deal and the drawing of the Exchequer, share a set of standardised conventions despite being made at geographically diverse places and times and this strongly suggests that there was a medieval craft tradition that taught both these men to draw in this way. The most likely source of these conventions is the architectural drawings of the Middle Ages, and more precisely, the full-scale groundplan laid out on the earth which was adapted in order to provide patrons with a working drawing of the site. Looking at these images as marking a point of transition invites the question of why craftsmen should begin to represent their work technically, on paper and at small scale. There seem to be two possible reasons: either the draughtsman begin to represent their designs of a complete building on paper because the complexity of the royal interiors demanded that they use small scale work, or because they are being asked by the King to produce groundplans so that he can examine and perhaps plan or alter the domestic organisation of his suite of rooms. In this instance form follows function as much as function follows form and it is difficult to distinguish cause and

effect. The work itself is likely to have become complex through the increasingly difficult demands of Henry VIII and yet, at the same time, the King was presumably planning and explaining the long and complex networks of rooms that he wanted through the use of drawn plans. It is likely that the King's domestic apartments developed in size and intricacy alongside the technical plans which were made to represent them and that the King was able to make demands of his builders for the kinds of vast single-level privy apartments that we see at Whitehall precisely because the small-scale groundplans that were provided by his craftsmen allowed him to demand and design ever more intricate internal domestic arrangements.

The interrelation between form and function invites a re-examination of Simon Thurley's argument, which tends to over-emphasise the influence of how domestic spaces were used and fails to consider how the form of the design drawings themselves may have shaped the building produced. Thurley argues that Henry begins to personally intervene in the design of his works between 1529 and 1531 on the grounds that the model of royal apartments favoured by both Wolsey and Henry VII (the donjon or tower wherein the most private apartments were reached by going higher up the structure) are abandoned in favour of expansive single level apartments. Thurley argues that these design changes show the King's personal intervention in the design of his palaces at a point when, succeeding Wolsey, Henry begins to take design control of the royal works. This argument needs to be complicated for changes to the ancient design of the stacked tower of the donjon take place between 1529 and 1531, at exactly the time when references to drawings being made for the King begin to appear in the financial accounts of the works at Whitehall and Hampton Court. This strongly suggests that the drawings themselves had a formative influence over the designs being made, and it is likely that the King's personal desire for increased privy space was given a material referent by the drawings in which his craftsmen were able to realise the King's wishes. A paper groundplan like that of the Exchequer can portray large single-storey works in great detail but has some difficulty in representing the interrelationship between different levels. This plan would have encouraged both parties to think not vertically but in terms of single level palaces that could extend horizontally and still have allowed the king and his craftsman to maintain the enclosure of the suites by carefully limiting the points of entry. The extreme architecture of a palace like Whitehall seems to replicate the bias towards single-storey architecture within the plans themselves,

highlighting the effect of the design drawing in shaping the generic demands of the King for increased privy space.

It is not, therefore, exclusively either the difficulty of the work designed by masons in the 1530s, nor the demands of the King that cause the incorporation of technical drawing into the work made for patrons. A staged process being described here, the initial demands of the King are for increasingly extensive privy space (following a late medieval royal trend which is exaggerated by Henry VII) and in response to these demands new design concepts for complex and intricate suites of privy rooms are conceived by Henry VIII and his craftsmen at the same time as these ideas are materially realised on the page using the technical groundplan. As the above passage suggests, it is possible that the groundplans themselves encouraged both masons and the King to design buildings that expanded horizontally, rather than vertically.

iv. Conclusion

I have not been able to prove that the large quantities of paper bought to make the plans of Whitehall and Hampton Court in the early 1530s were used to make technical groundplans of a type seen in the surviving plan of the Exchequer dated from 1534. Unless the drawings themselves still survive to be found, it is unlikely that we will ever know for certain exactly what kinds of drawing were used to design these early palaces, but it does not seem unreasonable to suggest that the technical groundplan was made for the first time three or four years before the first extant example.

The evidence cited above explores the fact that the palace which was built at Whitehall following the 1531 plans seems to follow the bias within the technical groundplan itself towards single-level, horizontal expansion and this may suggest that a drawing style very like that seen in the plan of the Exchequer was being used at the earlier date. Furthermore, we know that Clement and Dickenson were able to draw technically by 1539, and it is possible that these craftsmen were using the technical mode in the drawings made for the King of the works at Hampton Court. An oblique view of the outside of Hampton

Court (of the kind produced in the pictorial plans of Deal and Walmer³⁵) would not have been able to represent the arrangement of the internal rooms, privy galleries and gardens, features that Starkey and Thurley suggest were the central concern in Henry's domestic building programme. In contrast, the plan view of Deal is able to represent internal room partitions, doorways and staircases with great facility, and given that the arrangement of the privy chambers were of great importance to Henry, it is likely that the drawings with which he was provided focused on the portrayal of these features. It is therefore possible that Clement and Dickenson began to incorporate graphic conventions used in full scale groundplans into small-scale work in order to redesign internal rooms from the early 1530s, starting with the work on the King's privy chambers in Hampton Court. In any case, it is a matter of when the technical mode began to be used in drawings made for the King, not whether it was used at all, for the plan of the Exchequer shows that from at least 1534 the King was being provided with technical groundplans.

Unfortunately the gap between 1530 and 1534 has some wider importance, for it cannot be known for certain whether Henry was being provided with technical, working drawings during the period when the first stage of works on the King's privy suites at Whitehall and Hampton Court were being designed. Firm evidence that Henry could have used technical drawings to influence the design of his privy chambers at these sites cannot therefore be provided.

If it could be shown that technical plans were being used by Clement and Dickenson in the early 1530s, there are also some important consequences in terms of material historical connections between people: John Rogers was trained as a stone mason at Hampton Court between 1533 and 1537 before being appointed as Master Mason at Guines, and he would have learnt his drafting techniques and the technical idiom not only, as has been previously suggested, from training in the use of working drawings, but also from the paper plans of Hampton Court, Nonsuch and Oatlands which we know from financial records were made by Clement and Dickenson throughout the 1530s and taken to

³⁵ The oblique view does however represent an important design feature of the fortifications, portraying the numerous cannons and various entrance points within the external walls. It is possible that Clement and Dickenson used the pictorial mode as a way of representing the fortifications, a form of building of which they had no previous experience, and that this work is not representative of the drawings that they use to portray domestic buildings. The groundplan of Deal castle in fact shows that they had great facility with representing domestic features, notably with the portrayal of doorways and staircases without disrupting the boundary lines of the technical idiom.

the King. Rogers would, in other words, have been around men who were making technical images on paper for the King between 1533 and 1537 and this would probably have informed his construction of the technical, scale drawings of Guines and the Calais pale in the 1540s.

Regardless of the precise date of its introduction, we know that the technical groundplan was being used by 1534, and it seems to me likely that the transition between pictorial and technical representation in the plats made for the King probably took place over the course of the 1530s and was well established by the end of the decade. This transition occurs against the context of the arguments Starkey and Thurley provide, for their work suggests that Henry had good reason to pressure his craftsmen to produce images that allowed him direct control over the design of his works, for shaping the architectural spaces that surrounded the King allowed Henry to control privy councillors and the privy chamber by limiting their access to the King's person.

Locating the transition from pictorial to technical work around a starting point in 1534 also provides an explanation of why the extant drawings made after 1539 suddenly and otherwise inexplicably appear in the archive apparently fully formed, with a set of shared graphic conventions and a well-developed technical style. In the current critical work on the history of the map during this period, the plats of Guines and the technical work which follows them are isolated examples, unconnected to the history of the English craft skills which were used to produce them, hence the reliance on an as yet undiscovered continental source to explain the sudden appearance of scale drawings in the English archives. My own work argues that the technical idiom was incorporated into the plats made for the King from at least 1534, and that the skills used to make these drawings can be found in the graphic techniques used in medieval architectural design drawing.

Likewise, the actions of Henry VIII after 1539 are difficult to understand without the history of technical drawing outlined above. For as the history of this period stands, it can seem that following the 1539 device, Henry is suddenly and inexplicably experienced in the use of maps and plans to control the various fortification works he finances. I am suggesting that what we see in 1539 is actually the expansion of a programme of royal building from the domestic to the military, and that Henry and his craftsmen have been working with technical plans during the 1530s as a way to lay out complex architectural designs.

The evidence of Henry's graphic literacy after 1539 ought to work to retrospectively support the thesis that he has been using technical drawing throughout the 1530s, for the wealth of information about the King's use of maps immediately after the 1539 fortification programme strongly suggests that Henry had extensive experience of using plats before this date within the patron-builder relationship that I have outlined. The next chapter goes onto look at the correspondence sent between Henry and the master masons working on the King's fortifications at sites across the south of England and the French territories. The negotiations between the King and his craftsmen rely on technical drawings to communicate the shapes of local landscapes and fortifications and to structure the planning and design of new works. The abundance of evidence for this later period should not obscure the fact that this mode of communication was probably shaped by Henry's interaction with his craftsmen during the 1530s as the relationship between craftsmen and patron evolved over plans of domestic architecture and through the King's own demands for increasing privy space.

Chapter Four. Henry's patronage 1539-1546

The second half of this chapter completes the chronological sequence begun in chapter two, examining the changing forms of the map and connecting these graphic innovations with the changing forms of map in use up to the point of the King's death in 1547. It examines the evidence for Henry VIII's use of the drawings provided by his masons and considers how this shapes the form of the local map. In this period there is relatively extensive evidence of how the King used plats to control the design of his works. However this evidence ought not to cloud the argument that technical drawing was probably introduced into small semi-scale work made for patrons during the 1530s. This chapter is divided into four subsections, each of which contains a case study of the letters and/or the plats made for individual sites at Hull, Boulogne, Ambleteuse, and Camp.

The first section of this chapter examines three plats which portray John Rogers' proposed renovations to the King's manor house in Hull and examines the extent of Henry's intervention in the design of the works. It argues that the King and Rogers met at Whitehall in the Christmas of 1541 and used the technical groundplans which Rogers had made at Hull to draw out a third design which allowed the King more extensive privy chambers by dividing the medieval hall into two floors. Hull is a good example of how drawings made in the technical mode can be re-drafted in a way that allows a range of images to be compared and design ideas evaluated. This section also suggests that it is possible that similar drawings were used by Henry to divide great halls at works made earlier in his reign, notably The More in 1534. This section also briefly examines the drawings made of the fortifications at Hull. These drawings are comprised of landscape and architectural maps and it seems that before designing his fortifications Rogers made drawings of the existing environmental features, features which were then copied onto new sheets of paper as a limiting framework within which to design future architectural proposals. The Hull drawings are an early instance of a master mason making landscape maps at a preliminary stage of his architectural designs, a technique later used at Guines and Ambleteuse and discussed more fully later in the chapter.

The second section of this chapter examines the works at Boulogne. It considers the letters which were sent between Whitehall and the English territories in France in October 1544, the period immediately after the fortified town had been captured. Henry leaves

Boulogne on the 4th October and the following weeks are marked by a breakdown in the established chain of command as the marshal gentry and master masons left in command of the defence of the works began to make decisions independently. The letters sent during this period clearly show Henry re-asserting his military and architectural control over the council at Boulogne. Threats and reminders of his own architectural expertise are followed by letters which show that the King was using design drawings to control the architectural works proceeding on site. This section also returns to an earlier argument to suggest that, despite the technical mode allowing the King a detailed engagement with military design of his works through a set of drawn plans, the negotiations between patron and builder are still made through a combination of written and graphic instructions.

The plats and letters that surrounded the making of the fortifications at Ambleteuse, a site located on the coast between Boulogne and Calais, show that by 1546 at the latest, Henry was using maps of the local landscape sent to him by his master masons to draft his own fortification designs in Whitehall without ever having seen the site in question. Section three looks at the letters and plats associated with the works at Ambleteuse. Beyond providing evidence of Henry's familiarity with both architectural design and landscape mapping this section also considers the development of a form of landscape mapping which began to represent similar aspects of the local environment across a range of maps and moved away from a medieval tradition in which local landscape had been represented in a variety of different ways according to the individual demands of the maker. This section recognises that it is unusual for local maps to treat the accurate representation of distance and direction of local environmental features as the most important part of a map and suggests that this approach arises not out of a trans-historical tendency to see landscape as an object of empiricist investigation, but out of precise contextual reasons. My argument states that a mason like Rogers tends to prioritise the accurate representation of the proportions of a landscape, not because this is in any way a normative approach but because, trained as a mason, Rogers represents landscape in much the same way masons represented architectural features: by producing images that above all else aim to accurately represent the dimensions of their subject.

Section four of this chapter considers the letters which were sent between the King in Whitehall and his diplomats in Boulogne in order to negotiate the details of the treaty of Camp, a 1546 peace settlement with the French that hinged around the precise placement

of the boundary between English and French territories in the Boulonnais. This correspondence shows Henry's master masons, including John Rogers and Richard Lee, were used to make landscape maps of the local area. These maps were used to show Henry the precise layout of the area surrounding his captured fortifications and to draw an outer boundary that favoured his own position. This section argues that the negotiations around the treaty of Camp show that in the final years of Henry's reign the types of maps being made by masons are adapted: landscape maps that had once been used to provide a survey of an area prior to the design of fortifications are now being made to chart the landscape as an important end in itself. The correspondence suggests that Henry orders his masons to adapt their graphic skills in order to create landscape maps that would allow him to define a favourable boundary line between the French and English territories.

This chapter uses four separate case studies but aims to show that there are consistent themes to the way in which maps were used during the 1540s. Throughout the period, and continuing a trend established in the 1530s, Henry's negotiations with his masons were conducted using design drawings that were made in the technical mode and which allowed a process of comparison, alteration and re-drafting that enabled the King to take part in the design process. Alongside this description of map use, this chapter also considers the changes within maps themselves. During this period there are enough surviving drawings to suggest that the images made by masons for their royal patron begin to represent an increasingly wide range of subject matter. From the early 1530s masons provided architectural groundplans which were probably small-scale replicas of the full-scale groundplans which had, during an earlier period, been laid out on the earth, examples of which are the drawings of the Exchequer in 1534 and the plats of Hull Manor in 1541. Plans provided for patrons begin to alter as masons start to produce surveys of local landscape prior to the design of fortifications. Examples are the plan of the landscape at Hull in 1541, and Ambleteuse in 1546. The treaty of Camp provides an end point to this transition in so far as it is a representation of landscape that is made in order to represent the local environment without a directly architectural purpose. By the end of Henry's reign all three types of image are being produced for patrons simultaneously. The details of the transition between scale drawings of architecture and landscape relies on the analysis of the letters

and plats that constitute the body of this chapter, but given the modern critical work being made on landscape, my use of the term can usefully be clarified.

The word “landscape” was introduced into the English language from the Dutch vernacular in the early seventeenth century and as Alexandra Walsham explains,

Originally it meant not a physical tract of land with its distinguishing features and characteristics, but rather an artistic depiction of this, as seen from a particular perspective and through the lens of an individual spectator. Only gradually did it come to be used to denote actual places rather than the subjective simulacra of them that artists produced on canvas and paper.¹

Walsham here describes how the word “landscape” originally referred to the subjective views of the local surroundings produced by artists and only gradually began to be used to refer to the actual, three-dimensional space that surrounds a person. However, modern critical work has challenged the idea that the physical space that surrounds a human subject is an “actual place” and suggested that, like a painting, the landscape is a “cultural image” that has been contrived by centuries of human intervention and/or human representation.² As Denis Cosgrove suggests, all “actual places” are interwoven with written and artistic representations, and to understand a landscape “it is usually necessary to understand written and verbal representation of it, not as ‘illustrations’, images standing outside it, but as constituent images of its meaning or meanings.”³ Walsham’s study of landscape in the early modern period suggests that it was in fact commonplace to view the landscape through a filter of historical and religious texts and graphic representations and that there was a widespread tendency to see the local landscape as a “dense and complex system of signs and symbols that can be decoded and deciphered.”⁴ Given her work on the Reformation and its effects over the contemporary perceptions of landscape, she

¹ Alexandra Walsham, *The Reformation of the Landscape: Religion, Identity, and Memory in Early Modern Britain and Ireland* (Oxford, Oxford University Press, 2011), p.2. On the etymology of “landscape” see also: John Brinckerhoff Jackson, *Discovering the Vernacular Landscape* (New Haven, 1984), p.3-8.

² Denis Cosgrove, ‘Introduction: Iconography and Landscape’, in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*, ed. by Denis Cosgrove and Stephen Daniels (Cambridge, Cambridge University Press, 1988) pp.1-10 (p.1).

³ Cosgrove (1988), p.1.

⁴ Walsham (2011), p.6.

particularly emphasises the point that early modern people “from all sections of the social spectrum,” confused human structures and the natural, geologically created features of landscape and

conceived of the physical environment they occupied as the work of the deity, as a sculpture designed by the Lord, which bore the marks of His intervention, as well as the desperate efforts of the devil and his band of demons to lead men and women to spiritual damnation. Steeped in the theology of Creation and providence, they did not share our aptitude to polarize the raw matter of nature and the products of human culture.⁵

Walsham’s work combines modern theory and a history of the period to argue that the early modern subject did not have a clear idea of “actual place,” perceiving the built and natural environment as, primarily, an expression of God’s work. She cites numerous sources that demonstrate the prevalence of this worldview, and my own work does not seek to question her thesis. However, within the discussions between Henry VIII, his privy councillors and his craftsmen, within, that is to say, a limited and possibly contained coterie of noblemen and technically trained craftsmen, there was a concern with the accurate portrayal of a select group of landscape features of the type that would affect the shape or placement of a fortification (coastlines, forests, hilly terrain etc.). Within this circle of correspondence landscape was not used as a coded text or symbolic image which could be analysed to uncover religious or historical meaning.

Despite critical dissatisfaction with the branch of human geography that, in its, “interpretation of landscape and culture has a tendency to reify landscape as an object of empiricist investigation,⁶” it is difficult to avoid the fact that Henry VIII and his craftsmen were concerned with the landscape as an object with distance and direction that could valuably be recorded in the map. However, there are precise contextual circumstances that lead to the historically specific and historically contained period in which empirical investigation was the central concern of England’s most prolific map makers and users and I am not suggesting that this concern is trans-historically applicable to local map makers.

⁵ Walsham (2011), p.5.

⁶ Cosgrove (1988), p.1.

As this section will suggest, during the 1530s local maps were made by masons who had been trained to represent domestic architectural features within the technical mode. When these men were forced to confront the landscape features into which their military designs were inset, and moreover, to design works that responded to the natural advantages of a site, it seems that a master mason like Rogers approached the representation of the landscape as if it were itself an architectural feature, drawing out shapes that above all else aimed to accurately represent the dimensions of their subject. It is exactly this tendency that Henry and his councillors exploit, using the scale drawings of local landscapes to design fortifications without having seen the ground itself, or putting these masons to work making landscape maps around which peace treaties could be drawn up. The use and making of local maps in this period is conditional on contextual circumstances: the skills of the master masons and the demands of the King. In a later period it is the professional surveyor rather than the master mason drawing maps, Henry is no longer the patron being supplied with images and the context for making maps changes. However, in the 1530s and 1540s the development of the map is shaped by the working relationship between Henry and his master masons, a relationship that relies on a limited set of masonic craft skills and which uses maps in precise ways, prioritising the accurate representation of architectural and landscape features.

In the following chapter I use the word “landscape” and my own usage is concerned with describing how Henry and his craftsmen move from using maps made of architectural features to maps of the local environment. The landscape I describe is not the “actual place” but it is the local environment as Henry and his craftsmen choose to represent it, with their emphasis on the accurate portrayal of a range of large features both man-made and natural. Unfortunately, Henry and his masons own approach to the local environment is close to those modern critics who attempt to “reify landscape as an object of empirical investigation” but in the case of the sixteenth century map there are contextual reasons why the map explores distance and direction that are unrelated to twentieth century attempts to uncover the “actual place.” Understanding the early sixteenth century local map forces us to confront the fact that map makers were increasingly concerned with the accurate representation of landscape features, and that this shaped the development of the map over this period.

The analysis of Henrician letters and plats put forward in this chapter does not conflict with Walsham’s work on the appreciation of landscape in the period and the use of

the Henrician landscape map among Henry and his close circle of masons and councillors is unlikely, even for the men themselves, to have set up any tensions with the early modern approach to landscape that Walsham describes. It would be anachronistic to suggest that the maps made for Henry during the 1530s and 1540s would have seemed to Henry and his courtiers to be cutting through a landscape enriched with historical and religious significance to get to the “actual place,” for as Walsham argues, the idea that maps can represent the territory itself is a decidedly modern idea. Maps that emphasised the accurate portrayal of man-made and natural features probably existed alongside a worldview that understood the natural world as a text or image through which both national history and God’s hand could be uncovered. Walsham’s work and my own examine two aspects of early modern culture that both shaped the perception of the man-made and natural landscape, but the conflict that we as modern critics may identify between the epistemology of an empirical exploration of landscape and a religious or symbolic approach to the interpretation of the local environment probably held little sway over early modern subjects. My own work on Henry VIII and the small group of gentry and craftsmen in correspondance with the King provides a close analysis of a set of prolific map makers and users, but this group of men are so contextually specific that my argument should not be used to challenge either Walsham’s broad analysis of the early modern appreciation of landscape or modern critical work which seeks to move away from studies which focus on the landscape as an object of empirical investigation.

i. The King’s Works on The Manor House and Fortifications at Hull.

In October 1541, Henry and his advisers arrived at Hull and personally inspected the walls of the fortified town. The result of this royal inspection was a list of proposed works.⁷ This device lists a number of proposed changes to the military fortifications which, the device specifies, are to be built “according to the kinges devise” and others, “as it please the kinges majestie to devise the same.”⁸ The king’s personal interest in the works at Hull extended to the redesign of the manor itself, and the device records that,

⁷ See: Lon Shelby, *John Rogers, Tudor Military Engineer* (Oxford: Clarendon, 1967), p.24-27.

⁸ London, The National Archives, MS SP 1/167 f.69r.

Item the kinge majesties house to be made to serve as a Citidell and special kepe of the hole town in suche forme as it shall please the kinges majestie to devise and appoint the same.⁹

Soon after the King's visit Henry transferred John Rogers from the building project at Guines to supervise the works at Hull, and we know that he was in discussion with the King from the start of these works, for by the Christmas of 1541, he was in London presenting the expense accounts of the works to the King.¹⁰ However, the extant correspondence between Hull and the King does not mention the three surviving plans of Hull Manor (see Fig 51 a,b,c hereafter Plats A, B and C). The plats themselves suggest that they were used by the King and Rogers to explore the design possibilities of the internal space of the manor house. Plat A is a drawing of the ground-floor of the house and the structure of the rooms it portrays is similar to that described in a survey of the manor which was taken in 1538. Plat B is a groundplan of the first floor of the house and makes some changes to the structure of the rooms: bay windows, fireplaces, and external stairs are added to the existing structure. These are relatively small details which, Lon Shelby points out, would have made the rooms brighter, warmer, and generally more comfortable for the royal presence.¹¹ Structurally, the internal walls are left largely intact but the addition of stairs and the sealing up of a number of interconnected doorways creates five privately accessed apartments. By far the largest of these is a suite of rooms around the north court which are unlabeled but which were probably intended as a set of privy chambers for the king. Plat B shows moderate changes to the manor house which could well have drawn on Rogers' experience of the layout of the King's apartments at Hampton Court. The third drawing, Plat C, is definitively distinguished from the earlier two by being labeled with an inscription which reads: "A new plat made by the same Rogers, of the King his hyghnis mannor of Hulle."¹² This inscription suggests both that this "new" image implicitly responded to an old as well as confirming that both images have been drawn by the "same" Rogers. Yet even without this subscription it would be clear

⁹The National Archives, MS SP 1/167 f.69r.

¹⁰See Shelby (1967), p.28 for a good description of the interrelation between the plats, on which my own analysis relies.

¹¹ Shelby (1967), p.39.

¹²London, The British Library, Cotton Augustus I.i.84.

that Plat C is intended to be viewed next to, and in comparison with Plat B and that they were all composed by the same hand. For Plats B and C do everything possible to facilitate a comparison. The overall size of the external shell of the building is almost identical, the graphic conventions in the representation of walls, windows and stairs are consistent and the scale of the images is the same. The combination of these effects foregrounds the differences in the layout of the internal rooms. We can understand why the plats may have been made to facilitate a side-by-side comparison in that Plat C extensively re-works the rooms portrayed in Plat B, and the changes proposed in the new plan can be understood and evaluated through a comparison with the earlier drawing.

Plat C portrays the effect of dividing the great hall (the single largest space in Plats A and B) to give an upper first floor chamber accessed by a processional stair rising from the north court and leading to an extensive suite of privy rooms, to which Shelby has ascribed a number of likely functions.¹³ The design changes proposed in Plat C can be precisely associated with the architectural tastes of Henry VIII, for apart from Hampton Court (which was begun at the very earliest point of Henry's involvement with the Royal Works), the King either did not build a new great hall, as at sites like Nonsuch Palace where the palace was started on clear land, or he converted the existing great hall in just the way we see at Hull: by dividing it to create two storeys, the upper of which formed the first in a suite of privy rooms accessed by a processional stair. Simon Thurley writes extensively about the declining use of the great hall in the Middle Ages, a trend that reached its most radical expression under Henry VIII who "systematically removed" the great hall from his lesser houses, notably from The More in Hertfordshire, inherited from Wolsey and converted in 1535 and at Rochester, where conversion started in 1541.¹⁴ In light of this wider context we can begin to postulate a history of how these plats were used and why they were made. Plats A and B were drawn by Rogers on site and used a survey of the external walls of the house to lay out some moderate changes in line with what Rogers knew of the King's apartments at Hampton Court. Given the evidence that Rogers travelled from London to Hull in the Christmas of 1541,¹⁵ it is probable that he took these plats to the King, who, unhappy with the layout of his apartments in Plat B, then proposed a design which had worked well at other sites and

¹³ Shelby (1967), p.42.

¹⁴ Thurley (1994), p.36-37, p.113-116.

¹⁵ See Shelby (1967), p.28.

divided the great hall into two storeys. Consequently, Rogers and the King drew Plat C, the “new plat,” in conjunction, using the shape and dimensions of the external walls of the house that is portrayed in Plat B as a starting point. This series of events would also explain two oddities of the maps. Firstly, Plat B is trimmed very neatly around its external walls, while Plat C is portrayed with a large border. This would make sense if plat C was made at Whitehall rather than at Hull, and so relied on using Plat B as a template from which the shape of the external walls could be traced. Trimming the edges would have made the external walls of Plat B easier to follow when placed underneath the “new plat.” Secondly, this series of events would also explain why Plats A and B are labelled using extensive dimensions while plat C is not, that is, because Plat C was made not from a survey of the site but from a traced outline taken from Plat B.

If we accept that these images were used by the King to challenge Rogers’ proposal and portray his own ideas, albeit through Rogers’ draughtsmanship, then this point has connotations for the earlier sites at which we can see the King’s design principles being realised. For we know that paper was bought to make plats and that these were taken to the King in the 1530s and, furthermore, the Hull evidence from 1542 suggests that these plats were used by the King to alter proposals so that they better suited the domestic arrangements he personally favoured. At sites like The More, where we can see Henry’s personal bias towards certain kinds of design being exercised, it is at least possible that plats were used by the king as a way of working out the layout of his domestic space. It is important to remember that in 1542 we may be seeing late evidence of the use of a style of technical drawing that had first been used by the King during the early 1530s.

How this process occurred cannot be known for certain, given the same lack of evidence that forces extrapolation back from one period into another. However, it is likely that through a series of promotions and dismissals over the course of the 1530s, Henry would have been able to gather around him a group of craftsmen who drew in a way that allowed him to most efficiently control the design of his palaces from wherever he happened to be. We know that in the 1540s the King favoured two master masons, and John Rogers and Richard Lee appear repeatedly in the king’s correspondence as they travel between the King at Whitehall and the King’s fortifications from Boulogne to the Scottish border. In the 1530s it seems that two pairs of craftsmen, Clement and Dickenson and Russel and Molton were similarly favoured by the King and the works across London and the Thames Valley were

divided between them. I would suggest these men were favoured precisely because they drew in a way that allowed the king to design and re-design his domestic apartments, a process for which there is firm evidence for the first time at Hull in 1541/2.

The above argument looks at the plans of Hull Manor, but the drawings of the fortifications at Hull are an important example of how maps of the local landscape features were made before appropriate fortifications were designed. Three very large scale drawings of these works survive. Like Plat A of Hull Manor the process of drawing the new fortification began with an initial survey of the existing site, which has survived, and the landscape survey was probably used as a basis from which to construct the drawing shown in fig 52. A third drawing of the fortifications is also likely to have used the initial landscape survey. All three of these drawings use the same characteristically shaped and very large pieces of parchment and the fortifications and landscape they portray are all drawn at the same enlarged scale.¹⁶ From a starting drawing of the landscape the shape of the river bank was probably traced onto new pieces of paper and used as a starting point to plan out the works in fig 52, potentially with the King, at Whitehall. A similar process is used at Guines where a survey of the existing walls of the castle is produced and the new works projected over this initial image, and this chapter will come to consider the same progression between landscape and architectural drawing at Ambleteuse, where we know more certainly that Henry used an initial landscape drawing to design a set of works from his seat at Whitehall without visiting the French territory.

ii. The Works at Boulogne.

In contrast to the domestic and military drawings made at Hull - drawings which contain internal evidence that suggests that they were made as part of a discussion with the King but about which there is little epistolary evidence - the letters that surround the fortifications of Boulogne provide us with evidence about exactly how the King used his plats. In early 1544 Henry VIII, in alliance with Charles V, invaded French territory south of Calais. After laying siege to Boulogne for nearly two months, Henry VIII entered the fortified town on the 18th September.¹⁷ The process of the siege itself, which involved the successive

¹⁶ See British Library, MS Cotton Augustus I.ii.49; Aug. I. Supp. 3; Aug. I. Supp. 4.

¹⁷ Shelby (1967), p.53-61.

breach of the town's various rings of defence, must have given Henry a good grasp of its potential weaknesses. A letter from the Privy Council dated the 4th October is written four days after the King's departure and responds to the news that Boulogne had been abandoned. It reminds the council at Boulogne that Henry had made detailed plans for how the town was to be re-fortified and that had they begun "making your bastilion as his majesty had appoynted [...] and thes things fynissed wich wold (as he sayeth) have byn don in short tyme you shuld have come in all safty to the rescue of Calaye."¹⁸ The Privy Council is careful to remind the recipients that his majesty devised the fortifications that should have protected the town, and that the King, even from the remove of Whitehall, is still very much aware of what can and cannot be done. The neat interpolation of the phrase, "(as he sayeth)" makes it clear that it is Henry's voice which underlies their own collective assurance of how long it should have taken to construct the defences the King devised. Yet the ability to establish the King's command from across the channel seems to have been precisely the problem at issue, for problems at Boulogne seem to have begun almost as soon as the King left the site and his own defensive works were re-considered by his craftsmen in light of the King's removal to Whitehall. In a letter dated the 5th, the Council at Boulogne led by Edward Seymour, the Earl of Hertford, writes

Pleaseth it your most excellent maestie to understande that yesterdaye in the morning we assembled our selfs upon the ground without the towne called the old man wheare your maijestie had devised to have a bastillion and there with the advise of sir Richard Lee and [John] Rogers and [Richard] Candishe consulted upon the same where everie man sayed frely and franckely his opinion, and was finally concluded by all our agreemete that neither in that place ne eny other about the towne, by eni woorke that can be made this winter, neither basse bologne or the haven may be so fortified,¹⁹

The letter continues to describe an account of a skirmish with some French troops near Boulogne before concluding that, given the reports that the French were moving north, and

¹⁸London, The National Archives, MS SP 1/ 193 f.22v.

¹⁹The National Archives, MS SP 1/193 f. 28v.

having before resolved, by the advice of Sir Richard Lee, Cavendishe and Rogers, that such a bastilion could not be made this winter to satisfy your Majesties purpose as the same desireth, we resolved that morning to depart with the army to Calais²⁰

Following the essential abandonment of Boulogne on the 4th October, the King is facing what is little less than a crisis: his capacity to control the design of the fortification works and the movements of the army with which they are interconnected has clearly slipped away in the face of a council held “upon the ground without the towne.” It must have seemed in Whitehall that confusion reigned in both the works teams and the army as a consequence of these independent decisions. A letter on the 5th shows that the King at first responded by sending Richard Lee²¹ back to the town with further instructions.²² On the 8th October, the King writes a letter that, after the usual salutations, addresses itself directly to the Councillors and states,

lyke as there is none more willing in all just occasion to take in good parte the good doings and probable grounds of his Counsellors forexcuse, though sumtme they fayle in their well doings and executing his comandments, yet is ther none agayn that hardly can bere bolstering and unaparant reasons specally when they enclude a fayned necessetie to cloke and mayntayn their faulte, to moche apparent to indifferent [e]yes.²³

²⁰The National Archives, MS SP 1/193 f. 28v.

²¹ On Lee's life see John Harvey and Arthur Oswald, *English Medieval Architects: A biographical dictionary down to 1550* (Gloucester: Alan Sutton, 1987), p.161-162. Lee is likely to have been the son and grandson of master masons. For his appointment at Calais in 1536 see Colvin (1973), p.352 On Roger's training at Hampton court see chapter two, above and Shelby. *John Rogers* (1967), p.5-6; Lee's own early training seems to have left him with a less than full grasp of the technical idiom and he can be connected to a number of pictorial if highly detailed pictorial views of the King's works at Dover, Calais and Edinburgh. See: Peter Barber, 'England II: Monarchs Ministers and Maps', in David Buisseret, *Monarchs, Ministers and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe* (Chicago: University of Chicago Press, 1992), p49, n. 60. However, Rogers and Lee often worked together and it is not always possible to attribute the technical plats to Lee or Roger's definitively. We know that by 1545, Lee, working alone, produced a fine example of technical drawing of the town of Portsmouth. See: P. D. A., Harvey, 'The Portsmouth Map of 1545 and the Introduction of Scale Maps into England,' in *Hampshire Studies*, ed. by John Webb, Nigel Yates, and Sarah E. Peacock (Portsmouth: Portsmouth City Records Office, 1981), pp.33-49.

²² A letter from the Privy council dated the 5th October shows that the councillors in London and the King hastily scrambled a response to Norfolk's report cited above by sending a brief note with “this berar Sir Richard Lee whom his majestie half instructed all and long shall advice you att lenghte, his highnes pleasure is yow shall give full credence accordingly.” Yet this written response, translated through Richard Lee, one of his master masons is only the first wave of correspondence mustered by King and his administration at Whitehall. See the letter from the Privy council dated 5 October 1544, The National Archives, MS SP 1/ 193 f.28v.

²³The National Archives, MS SP 1/ 193 f.69r.

How exactly the Duke of Norfolk and the marshal gentry at Boulogne would have read this passage is not recorded, but the passage's description of how the King has seen through the "fayned necessetie" which his Councilors have used to cloak and cover the true goings on at Boulogne must have had alarming overtones of a set of conspirators being discovered. The letter continues by asking the Councilors if they themselves think it is likely that their decision to leave Boulogne undefended was "well to be taken of us" the King, a decision which he points out was "so clene discrepant from our commandment" and the letter goes into some detail on the failings of the commanders before turning its invective on John Rogers and Richard Lee, stating,

To the fifth as touching the making of the bastiolion though lee and Rogers might happen to say that they thought it was hard in a short tyme to make a bastilion to withstand an army yet nevertheles we know them not to be men of suche experience that therfore the making of suche a one was utterly to be relinquished, for that knowlege that they have they have lerned only at our hand / And therfore it had ben more mete for you, ere you had utterly relinquished the doing of it, to have knowen what we could have sayd to it and then we doubt not but you shul have beyn well satisfied and not have byn hable to have sayd [anything] but that ther might suche a bastilion have byn made.²⁴

The King here frankly re-asserts his own authority over his master masons by stating that all of the "knowledge that they have, they have lerned only at our hand" and this might well have been more like a reminder than an empty assertion of authority, for Rogers and Lee had been working since 1540 and 1536 respectively on the King's fortified sites but they were appointed by the King to their military posts and were by training domestic architects.²⁵ What becomes clear is that by 1544 Rogers and Lee had overreached themselves by cutting Whitehall out of the decisionmaking process in favour of their own

²⁴The National Archives, MS SP 1/ 193 f.69r.

²⁵For the use of domestic architects on the King's works see Colvin (1982), p.378-381. On the mediation between the King, the marshal gentry and the master masons in the design of fortifications. See Colvin (1982) esp. p.379-380 which argues that there is a precise Henrician style unrelated to advances in fortification on the continent and which probably came from King, craftsmen and gentry.

expertise and conclusions, given the conditions on site. In response, the king writes that he expects his military designers and his marshal gentry to maintain his position at the head of the chain of command, even in his absence. As the later correspondence suggests, plats and written accounts were used to make Whitehall the centre of the decision-making process at Boulogne. However, during this, the first wave of the King's response, Henry re-asserts his own Royal precedence as a King as well as writing out the terms of his own technical authority in very clear terms, as he states, had the commanders referred to him rather than the craftsmen who merely enact the realisation of his ideas, they would not have "byn hable to have sayd [anything] but that ther might suche a bastilion have byn made."

By the 11th November Henry had re-established his control over the works at Boulogne, and his position as the commander of the army, and decisions were once again passed through Whitehall via an exchange of letters and plats. The following letter, sent by the Privy Council to Boulogne lays out in some detail the process of deviating from the plats which represent the King's designs:

the kings majestie sendeth unto you by this berer the forme of the plat wich you sent to his hieghnis for the fortificacion to be made beside the old Man, whereunto his majestie hath added some thinge, and some thinge his majestie hath altered as youmaye perceyve by the same, and his grace pleasure is that in cace you shall thinke that this sayd fortifcation to be made by the sayd plat being thus altered by his hieghnes shalbe as strong as thother and as hable to be kept, his majestie taking it to be of no less forte then thother, and a thing that would be don moche soner, you shall then precede with the making of the same [...], and if you shall thinke any thing there mete to be altered then, preceding in the mean tyme to the doing of suche parte therof as shall make no alteracions so as there be no tyme Lost, you shall advertise his majestie of your oppinion therin with suche reasons as made you in the same with all dilligence²⁶

This letter accompanies a plat which is being sent back to the works at Boulogne with alterations made by the King, who we are told, has "added some thinge," and "hath altered"

²⁶The National Archives, MS SP 1 / 195 f.61r.

others. The letter continues to describe the process through which the works team at Boulogne may themselves alter the new design: all alterations are to be returned to the King and in the meantime work is to begin on the undisputed sections of the design. The King is clearly being particularly cautious in light of the recent chaos that ensued on his departure from Boulogne, establishing a complex and time consuming alteration and approval process that sets his own chamber at Whitehall at the center of the design process. This letter is important because it explains the process of using plats as a way of monitoring the works at remote sites, and it is clear the technical drawings are being used as more than simple records of the works: images are being altered and re-drawn by the King before being sent back to a site and then, possibly returned to Whitehall with further reasons for emendation. This is evidence of the kind of system that we can only suppose was also used to design palaces like Nonsuch, sites where we know that Clement and Dickenson were part of a similar circulation of plats between the site and the King. The system of continual alteration and comparison also relies on exactly the kind of technical idiom which we see being used to design and alter works in full-scale in the Middle Ages and which survives on paper for the first time in the plats of Deal Castle and the Calais Exchequer.

The letters surrounding the re-fortification of Boulogne are particularly useful in that they are a rare example of a system of correspondence being explained. Letters tend to be written between people who have already understood the terms of their epistolary relationship, and it is often difficult for us to understand the rules which structure the exchange. However, in 1544, the system through which Whitehall and the French territories communicated had clearly collapsed in the wake of the French campaign and the capture of Boulogne. In consequence, Henry VIII has to re-establish the terms of a system of correspondence, a system in which Whitehall was the central hub of any design or construction decisions. The crisis at Boulogne was probably not the first instance of plats being used in this way, but it is the first surviving explanation of the system through which plats were used by King and craftsmen.

Once the system through which the plats and letters are circulated between London and the Boulonnais had been re-established, Henry was able to take a direct part in the overall design of the works through the use of plats, but design drawings were not the exclusive form through which centralised control was exercised. Letters often specify that the bearer of the plat has been instructed to explain the image (the bearer often being the

draughtsman of the plat itself²⁷) and the text of the letter often gives a further set of design details. The letter from the Privy Council to Boulogne cited below gives very precise construction details for a temporary work to be constructed using earth and timber. The letter is written as if from the Privy Council, but the Council makes clear that it is writing on behalf of the King,

And if you shall stande in any doubt touching the making of the corners of the Bulwerke which cover the flanke his highnes thinketh that with stakes and rodds wounde together with other tymbre you maye kepe them upp aswell as if they were made with turge or any other Kynde of earthe, And for the galeryes which be appointed from the inner braye and so to rune about the Mountes and which must be twelve fote wyde within, his majesties pleasur is you shall make them of tymber and bourde them on the out side with bourde of two ynches thick, and make it so full of holes as a greate nomber maye stand and shute out of them at one tyme and to cover the rofe of the same with bourde, which his majestie doth not only take for a wonderfull force but also a greate comoditie and strenght ffor tholding upp of your mountes if speciall regarde be had in the making of them so as you fasten the tymbre of your galeryes wth long tymbre into your mountes.²⁸

This passage is reminiscent of the medieval contracts that gave detailed dimensions and jointing instructions. Here the King specifies, among much else, that stakes and rods of timber bound up in a timber frame should be used to support the corners of the bulwark, and that the board surrounding the earthwork should be at least “two ynches thick.” In 1544 there is still the kind of balance between word and image that we saw in an earlier period. The design images of the 1540s are very different from the pictorial plats made to accompany written contracts at the turn of the sixteenth century, but the late design drawings still do not contain a complete set of instructions for a work. On the other hand, in this instance, written instructions were not sent in place of a plat, for the opening of the letter which contains the passage above makes it clear that a plat of the work is also being

²⁷For examples see below, in the letters that surround the treaty of Camp, or above in the example at Boulogne, where Lee is sent back to France with the King’s instructions.

²⁸The National Archives, MS SP 1 / 195 f.61r.

included. Whitehall, it seems, balances its control of its fortification works through the use of a number of media, the spoken instructions given to the bearer of the letter, the plat and the written description of the letter itself.

iii. The Works at Ambleteuse.

Though design concepts continued to be communicated using a range of media throughout the sixteenth century, the correspondence and plats surrounding the works at Ambleteuse make it clear that by 1546 design drawings allowed the King to dictate the shape and size of his works using plats alone. There are three important plats of Ambleteuse see fig 53 a,b,c (hereafter Plat A, Plat B and Plat C). The history of these works begins in late March 1546, when Rogers and Sir Thomas Wyatt, (son of the poet) were sent to sound the sea depth of a stretch of coast near the village of Ambleteuse, and evaluate its use as a site for a fortified haven.²⁹ Edward Seymour, the Earl of Hertford writes to the Privy Council on 27th March 1546 stating that the results of this survey “shall appeyar unto you by theyre [Rogers and Wyatt’s] letters, to me addressed, which I send you herewith.” Part of this survey, and the letters sent to Whitehall in late March may have been Plat A, which shows an outline of the coast, the location of the town, the course of the river, and the extent of the tidal range surrounding the inlet. This preliminary survey of the landscape was almost certainly made by Rogers.³⁰ Plat A was also re-drawn and used by Rogers as a starting point from which to draft out a shape of a new fortification in light of the existing landscape. We know this because the image itself has survived. Plat B was clearly drawn over a copy of Plat A; not only is the representation of the landscape drawn from the same perspective position, it is also the same size and uses an identical way of representing landscape features (the representation of odd roofless houses is particularly characteristic). Moreover, the village of Ambleteuse we see in the initial landscape drawing has also been copied from the

²⁹ Shelby (1967), p.75-6.

³⁰See Shelby (1967), p.77. on the attribution to Rogers. One of the plats, plat B, contains Roger’s monograph, and plat A is attributed to him on the grounds of stylistic similarity.

earlier survey onto Plat B and then partially rubbed out to make way for the new fortification, evidence of which is very clear on the original. This use of the landscape image as a starting point from which is to draft the shape of new works is particularly intriguing because it is likely that Plat C used Plat A in a similar way. However, Plat C was probably drawn by the King in Whitehall, and it seems likely that Plat A, which survived through its preservation at Whitehall, was used to chart out the shape of a fortification at a remote site by a King who had never seen the haven at Guines. This is a probable course of events given that the design of the fortification proposed by Plat C fits with the description of the King's design given in the letter cited below and not with the designs proposed by any of the gentry or masons on site. Furthermore Plat C sets its fortification into a landscape much like that portrayed by Plat A, a landscape seen from the same perspective position and which uses the same conventions for landscape features. A letter, sent on the 1st April, five days after Rogers' initial survey of the haven, tells us that the King sent his own plat to his craftsmen at Ambleteuse, and in it Lisle reports back to the King on how his plat, a design with five bulwarks of the kind we see in Plat C has been received:

I came to therle of hertford to hable Estue, [Ambleteuse] this his lordshipp beyng there viewyng of the ground by the Campe, and [...]I toke occation to shewe unto the same, your majesties plat, with the newe addition therof beyng present, Mr Seymour, Sir Richard Legh [Richard Lee] and [John] Rogers, which by them all was very well comended, nevertheles, they could make no expresse resolution unto the same, for that it seamed they were in doubt whethur the place wold sirve to make the fort with v: bulwerke or with foure, And sithens uppon furdur vieu, I do perceave that my lord with the rest afforsaied, do fynd the lien more propice to fortife with foure bulwarke then with fyve, wherof his lordshipp, i doubt not, wold veray sone more amplye signifye unto your maiestie by platt³¹

The design of the fortification with four bulwarks promised by the company to the King could be Plat B, for there are four bulwarks, if one adds a small V-shaped protuberance extending out of the sea wall and providing covering fire across the haven. However, we do

³¹The National Archives, MS SP 1/ 216 f.74r.

not know if the King received and rejected this design or whether he sent a letter once again reminding his craftsmen and commanders of his own technical expertise and forcing the master masons to work with his plan, for the King's letters to Ambleteuse during an important eight day period have not survived. What we do know is that by 3rd April, Hertford writes to Henry to explain that having "taken downe thold walles of the howses in the towne and made the ground playne, that we might the better see howe to set firthe your majesties devise for the forte to be made here" the council do in fact decide that it "sirveth rightwell to your highnes devise [...] so that if your majestie had seen the grounde yt could not have been set furth to better purpose."³² Hertford's phrase is not accidental, for there must have been some novelty to being able to design a fortification which fits as neatly into the contours of the "grounde" without ever having seen the site. Ambleteuse is probably the first surviving example of the King using an initial survey like Plat A to view and analyse the innate complexities of a landscape and fit his own projected design concept within this organic environment. This remote design process relies on the plats using a standardised mode of representation so that Plat A, the drawing of the landscape, can become the basis of Plats B and C and the designs proposed by these two drawings of the different forms of fortification can themselves be compared and contrasted.

Within Plat A the drawing of landscape has been schematised into a graphic mode that allows it to be compared with the architectural drawings used to portray the proposed fortification in Plats B and C. However, in contrast to the technical idiom used to draw out the fortifications, the representation of the landscape in all three plats is pictorial: textures and perspective views have been used to represent its features and we see none of the stark graphic conventions that are used to construct the plan view of the architectural works set within it. In comparison to the hundreds of years of craft tradition in which the technical idiom's method of representing architectural detail had been developed, landscape had, in 1546, only recently been included as part of the working drawings made for the King. However, though the representation of landscape in Plat A uses none of the complex graphic conventions used to represent the fortifications, Rogers' training in the technical mode of the master masons seems to have allowed the draughtsman to improvise a representation of landscape into which the fortifications could be placed. This improvised representation

³² The National Archives, MS SP 1/216 f.101r.

may use pictorial elements to represent features like the cliffs, the shingle and the hills, but it sets these features into a framework that allows architectural drawings made using the technical idiom to be inset into the landscape without distorting the proportions of the landscape or the works themselves.

Rogers' understanding of scale allows him to relate landscape features meaningfully to one another and to the architectural works set into the landscape. The external proportions of the river inlet, the total external circumferences of the range of hills, or the extent of a coastline are consistently proportioned in relation to one another and in relation to the area covered by the drawing of the fortification, even if the types of mark used within an accurately circumscribed area are used to represent a range of objects from a series of different perspectives, as in the representation of the hills in the right of Plat B. The method of drawing to scale developed by Rogers at Guines, is clearly instrumental to the way in which landscape begins to be represented in the 1540s. However perhaps more important is the whole approach to the function of drawing that comes with Rogers' training as a master mason. For, trained in the technical idiom, Rogers approaches the representation of landscape as if it were a working drawing that is an instrumental part of the construction process itself. When confronted with a landscape that is of relevance to the design of the fortification he is planning, Rogers clearly decides that landscape needs to be represented within the graphic system used to work out architectural features. This approach treats the accuracy of the distance and dimensions of a landscape map as its most important feature. In contrast to the single set of criteria through which Rogers understands drawing, during the Middle Ages landscape maps had fulfilled a range of different needs and were used in a variety of ways.³³

Scale is then an important way to evaluate these late maps but following my own analysis of the origins of scale in chapter one, scale is itself a technique which was derived from Rogers' approach to drafting the walls at Guines. More important than scale *per se* is Rogers' appreciation of how drawing can be used as part of the process of construction, design, and social interaction, an appreciation that derives from his graphic training as a master mason. The mason's training in technical representation brings a set of criteria for

³³ For the best analysis of complete corpus of medieval local maps that had been found at the time of publication see: R.A. Skelton and P.D.A. Harvey, *Local Maps and Plans from Medieval England* (Oxford: Clarendon Press, 1986). This compilation of maps and critical studies gives a good idea of the range of styles used to draw medieval maps, and the multiple uses made of them.

what constitutes good and bad drawing to bear on the representation of landscape and it is this masonic way of understanding the function of drawing that we see expressed in his attempt to represent landscape as if it were an idea for a new web of window tracery, or a proposed groundplan for a royal suite.

From a different perspective, scale landscape drawings made by masons develop out of the need to produce a survey of the existing features of a site. They are derivatives of the kind of groundplan Rogers' makes of the manor at Hull, where Plat A of Hull Manor was made to represent the existing rooms on the lower floor, and this initial survey of the building was used as a starting point for the changes to the design of the first floor portrayed in Plats B and C. A similar process takes place at Guines, where Rogers surveys the existing, irregular walls at Guines as they are shaped by their hilltop location in order to have an accurate shape from which to plan the layout of the new bulwarks at the most effective defensive position. At Ambleteuse and in the drawings of the fortifications at Hull the existing features are themselves the landscape features of the sea, the river inlet, the cliffs, the high water mark, the hills etc. and in these examples, the landscape becomes the first term in the design of the building itself.

iv. The Negotiations around the Treaty of Camp.

In the correspondence which describes the plats made around the treaty of Camp we see how the portrayal of landscape becomes an end in itself, not merely a series of features to guide the plan of new architectural works. For the treaty hinges on the precise location of the river Laine and working out the precise course of this river is central to the successful negotiation of a peace settlement. It is Rogers and Lee who are used to make the landscape maps on which the treaty will be founded and their expertise was drawn entirely from the representation of the local landscapes around the architectural buildings on which they were working. The Treaty of Camp marks a point of intersection where master masons were, for the first time, being used to produce scale images of landscapes for their own sake, as part of a territorial dispute. What we see from the correspondence surrounding the Treaty of Camp is that the King takes advantage of the fact that his master masons have developed

a method of technical drawing which has, so far, only incidentally portrayed landscape, and uses these men to help settle a territorial dispute.

From the opening of the discussion over the terms of the treaty of Camp in May 1546 Henry has a well-developed plan on how to use maps of the area most effectively. A letter sent on the 9th May 1546 sets out the opening terms of the King's conditions for peace and explains three different sets of conditions to his ambassadors which are all based on different territorial boundaries. The first set of conditions are the most financially favourable to the English King, and they are accompanied by an agreement that Francis I give up to Henry an area of land which is loosely described in words. The second set of terms for peace, which are to be offered only if the first are not accepted, are less favourable to the King and perhaps in consequence of this Henry demands that they are accompanied by a firmer territorial boundary. Henry asks that the French "leave to our quiet possission Bulloyn and suche parte of Bullonoys and the Countie of Guysnes, as shalbe signified unto you [the English ambassadors] by a plat, assone as Rogers, who is already sent for, may comme and go unto you."³⁴ Rogers, it seems, is to be set the task of making this plat, "comme" to the King and then go back "unto you," so that, presumably, the King has an opportunity to set the boundaries he finds acceptable using the plat which Rogers has made. If these terms are still not acceptable, a financial settlement cannot be agreed upon and only a truce can be negotiated, Henry likewise wishes to firm up a different set of territorial boundaries, and the letter states that he will provide "an other plat whiche we minde to send by Rogers unto you."³⁵ Specifying, in both instances, that Rogers would be called back to Whitehall to show the maps he has made to the King before the final plat was taken to the French was probably a vital part of the use of the map in so far as Henry was concerned. For working on the maps with the draughtsman himself provided the King with a way to manipulate the representation of the boundary in his favour but also, presumably manipulate the image of the landscape on which the boundary was based. We do in fact have such a map (fig 54), a map marked with a red dotted line that perhaps represents the boundary set by the King in consultation with Rogers on this point. This map could well be seen as material evidence of the point of intersection I have described, a point at which the graphic skills of the Middle Ages are being used to make local, landscape maps which in turn

³⁴ The National Archives, MS SP 1/218 f.19v.

³⁵ The National Archives, MS SP 1/218 f.19v.

support the imposition of man-made territorial boundaries, rather than the design of new architectural fortifications.

Yet the process is far from complete. As can be seen, many of the landscape features of the map are pictorial, even if they are set within a scale grid, and the schematisation that will lead to a standardised set of conventions for representing landscape features in a way comparable with those used in architectural drawing is some way off. Representing the complexities of landscape within a standardised set of conventions is more complicated than the representation of architectural features using the same kind of criteria and the letters from Camp make it entirely obvious how challenging the mapping of a landscape was in the mid-sixteenth century.

This is partly, in this instance, because both sides suspect the other of deception: in a letter dated 17th May, the Privy Council requests that a party of French and English gentry “and suche others of bothe side as you shall thinke mete, ryde and vieu the rennyng of the said ryver” that is, the running of the river Laine on which the boundary terms of the treaty rested, but the letter continues,

and to thintent that his majestie woold playnly be informed of the said limitte Sir Rychud lee and rogers be privately despeched hens to have their attendannce upon you secretelly in your said journey, who may after set furthe the same in plat and after, [...] sir Rychyud lee [should] bring the plat to his highnes, but of thevent of making of this plat you shall not nede to give any notice to thother side³⁶

The letter suggests that even if a course for the river was agreed upon by both parties, the map made by Lee and Rogers should be taken straight to the King, not be shown to the other side. As in the earlier letter discussed above, Henry seems intent on seeing the map, and checking that its features were acceptable, and presumably modifying or re-drafting the image if needs be, before providing it as the basis of a discussion between his own ambassadors and the French. Throughout this negotiation it is clear that Henry has well understood that landscape maps can be manipulated to shape the territorial boundary that best suits his own position.

³⁶The National Archives, MS SP. 1/218 f.168r.

In reality the surveying party were unable to agree on the course of the river, and the body of correspondence that surrounds the Treaty of Camp is an example of the difficulty of mapping a complex landscape feature. In a Letter dated 27th May 1546, the Privy Councillors who had been sent to negotiate the treaty write to the King to complain that with the French ambassador Bochetel, they went to find the head of the river. The Privy Councillors (Lisle, Paget and Wotton) sign collectively but in the first person they state that ,

I and Bochetel went to see the hedd, but such a hed as liked him to shewe. I had in my cumpany the treasurer of Calaye, the Suveyor of Calaye, Sir Henry Paulmer, Broke the Baillif of Guines, Personne Haull, two of Mr Wallops best guydes, and two auncient men of Calays, and not one of these knew one ynche more thenne I knew of the ryver, for the hed. I was led so long through maresses and wooddes, that I thought myself mocqued; and at the last even fell out with Bochetel, and Jehan de Poco who was his principle guyde, and told them plainley that they mocqued me; and so returned back home in a gret colour, as wise as I went furth.³⁷

The Treaty of Camp is the best example of how, by the end of Henry's reign, the landscape mapping that we see in the maps of Ambleteuse is also being used to portray landscape but as the passage above suggests, even the basic process of travelling through a landscape provided difficulties, and landscape drawing has some way to go before it will develop the kinds of graphic convention we see being used to reduce complex features into the technical idiom, in a way that is comparable with the architectural drawing of the period. However, an important step towards this point is taken once maps begin to be made with the criteria of dimensional and proportional accuracy in mind.

As the letters around the Treaty of Camp and the building of the new fortifications at Ambleteuse suggest, the government at Whitehall has clearly understood how useful the map could be by the end of Henry's reign, for the landscape map allows the King and his Privy Councillors to remain in Whitehall and through the draughtsmanship of Rogers and Lee, design a fortification that fits within the local organic features, or remotely negotiate the placement of a territorial boundary. The pictorial elements of Rogers and Lee's drawings

³⁷The National Archives, MS SP 1/129 f.102r.

are intriguing and they foreground the complexity of architectural technical drawing, but the important point for the history of maps is that during Henry's reign the administration begins to understand how scale maps can be used to effect to manipulate events and processes.

The preceding chapters have examined the historical circumstances which led to the emergence of the technical plat in the sixteenth century. I have put forward two historical contexts which I have suggested shape the form of the local map: the effect of the master mason and the effect of the King and his administration. The maps themselves are physically drafted using an adaptation of the graphic and material skills taught to men as part of their training in the craft tradition of the master mason. Yet if it is a craft tradition that provides the draughtsmen of these plats with the material and conceptual skills to draw in a technical mode, it is the King and his administration that exploits these craft skills and forces their adaptation to uses unknown in the design of Gothic architecture.

While the early chapters of this thesis examine the graphic skills of the master mason, chapter four analysed the letters and plats which provide strong evidence of the King's involvement with the design processes that preceded the construction of the royal fortifications in the 1540s. The earliest examples from Hull suggest that the King used technical drawings to re-work plans for his domestic works, and relates this intervention back to sites where we see similar designs for the division of the medieval great hall being implemented in the 1530s. Later studies look at Henry's fortification works and examine sites where the King uses plats sent to Whitehall to authorise or amend the design decisions taken at Boulogne, and latterly uses maps of the local landscape to design fortifications that take advantage of the curvature of the haven at Ambleteuse without ever having seen the site itself.

Chapters three and four aimed to examine the relationship between the way in which maps were used and the changes that can be seen within the plats themselves. These chapters provide a body of evidence which suggests that maps incorporate techniques from a medieval craft tradition, and broaden their subject matter in ways that allow the King to use them to more efficiently develop, compare, alter and re-draft design proposals. In this instance, the use of the map shapes the form of the map, as internal graphic conventions develop in order to facilitate the function. Yet form follows function as much as function

follows form, and Henry's use of the map is itself broadened and complicated as changes within the kinds of plats made for patrons allow Henry to become increasingly involved with the design of his works through the incorporation of graphic techniques like numerical scale, standardised conventions and the representation of landscape and architectural features within the drawings.³⁸

Though there is good evidence to show that maps incorporate graphic techniques that facilitate Henry's map use, it is difficult to find evidence of how exactly this process occurred. However, it is reasonable to assume that the process of being forced to discuss, compare, evaluate and alter plats with the King probably encouraged the King's craftsmen to adapt their skills and, in turn, to draw plats which better facilitated the new range of uses to which plats are being put. Furthermore, the existence of such clear favourites in the 1530s and 1540s suggests that the King and his councillors encouraged and promoted those craftsmen whose graphic innovations allowed Henry to more efficiently use plats to alter and re-draft design proposals. The evidence provided by this chapter clearly shows that Henry used plats in this way and it is probable that it was through this system of promotion and dismissal that these techniques became increasingly widespread from the 1530s onwards. Henry's map use was, in other words, likely to have guided the changes that we see in the map, changes that themselves allowed the King to use maps to more efficiently alter and re-work designs.

Beyond the incorporation of graphic conventions like numerical scale within the map, the process outlined above also helps to contextualise the broadening of the subject matter

³⁸ There is also a good argument to suggest that the medium of the plats made for Henry itself influenced the way in which plats were used, for the drafting of technical drawings on paper in the 1530s may have provided its own kind of momentum to the process of change. In the medieval period full scale design drawings plotted out on the ground were automatically destroyed when a building was built, and drawings on the tracing floor were wiped clean when a new surface was required. Unlike the full scale working drawings that preceded them paper plats could be kept indefinitely and they could be moved and stored at a point of centralised administration, a tendency we see before the reign of Henry VIII in the description of the plats kept in the works office at King's college Cambridge. Paper as a medium innately provides these drawings the capacity to be moved to a central point and filed away, and plats that can be stored can also be compared, contrasted, altered, re-drafted etc. in a way that groundplans drawn in full-scale on the earth or incised into a tracing floor could never be. Keeping paper plats at a point of centralised administration invites this kind of use, the media of the plats guiding map use in a certain direction. Moreover, once plats begin to be used in this way a space is clearly opened up for the maps themselves to change in ways that better suit the new usage. The use of numerical scale is a good example of a technique that allows the new medium to be fully exploited for it allows a range of paper plats of different locations to be more readily compared and evaluated. For a study that focuses particularly on the effect of the materials used in graphic and textual representation see: Bruno Latour, *Science in action : how to follow scientists and engineers through society* (Milton Keynes : Open University Press, 1987), p.215-256; 'Visualization and Cognition: Thinking with Eyes and Hands', *Knowledge and Society*, 6 (1986), p.1-40.

contained in the work made for patrons as plans begin to represent architectural and landscape subjects. The plat of the Exchequer, the drawing of the existing walls at Guines, and the drawings of Hull Manor show that masons re-designing a building were probably familiar with making paper plans for a patron that incorporated new features within an initial drawing of the current architectural structures on-site. The drafting of the architectural features on a site was probably a starting point from which masons began to make landscape drawings projected in a plan view in order to chart the principal landscape features of a site and plan their fortification works in a way that responded to its natural advantages. However, by the end of Henry's reign the King is not only commissioning Rogers to make initial drawings of a landscape in order to plan his own designs from Whitehall, but he is also using masons to make landscape maps as part of a border disputes and without a direct architectural purpose in mind. This is a direct instance of Henry's own needs driving changes within the local map, for he forces his masons to adapt their craft skills to new purposes. The techniques which had originally been learnt in an architectural context are developed in order to portray landscape in a way that would have been unknown to masons working ten or twenty years before John Rogers. Henry's own demands for increased privy space in the 1530s and for a fortification system that would defend the English territories from threats of invasion in 1542 leads to an accelerated form of change within local maps as Henry demands that his masons use old graphic skills in new ways.

v. Conclusion.

In modern critical writing the changing forms of representation in the local maps of the sixteenth century have been ascribed to a number of different causes without extended analysis of the archival correspondence analysed here, or, more importantly, the medieval architectural drawing which I have linked to the Tudor plans. The most recent work on sixteenth century plats focuses on the origins of scale drawing and is produced by Gerbino and Johnston (2010).³⁹ Following on from the work of J.R. Hale in his chapter on English defensive works in *The History of the King's works*, (1982)⁴⁰ and PDA Harvey in *Tudor Maps*

³⁹ Gerbino and Johnston (2010), p.31-44.

⁴⁰ J.R. Hale, 'Tudor Fortifications: The Defence of the Realm 1485- 1558', in *The History of the King's Works Vol.IV 1485- 1660 Part II*, ed. by H.M. Colvin (HMSO: London, 1982), pp.367-401.

(1993)⁴¹ they argue that the new types of artillery and the consequent demand for defensive works which could withstand the increased firepower of the sixteenth century led to the development of new forms of design drawings.⁴² This argument relates the changes to sixteenth century plats solely to the design of fortifications being built after 1539. Furthermore, it argues that foreign craftsmen introduced scale drawing into England despite the fact that there is no evidence of this transition.

My own work describes a new form of drawing, the technical idiom, that re-focuses attention away from scale drawing as a singular characteristic of sixteenth century plats and connects the broader mode of representation used in the 1530s and 40s to its origins in medieval architectural drawing, distinguishing it from the pictorial mode used by masons and lay-persons during the Middle Ages. Describing the mode of representation used by the sixteenth century plats allows my work to confront the archival gap before 1539. The limited evidence available suggests that from at least 1534, and probably earlier, the King's master craftsmen were using technical drawing skills to work through ideas according to Henry's changing demands. As Starkey's work foregrounds, controlling the design and re-design of the King's domestic apartments was particularly important for Henry because his power was consistently exercised by regulating who was allowed access to his private quarters.

In response to the argument posed by Johnston and Gerbino, I would suggest that the use of plans in the 1540s accelerated changes in architectural drawing which had begun in the 1530s and was caused by Henry's need to precisely control and expand the domestic environments that surrounded him. Not only would I look to the 1530s rather than the 1540s, and to domestic rather than military architecture, for further evidence of developments in technical drawing, I would suggest that an appreciation of the changes to the local maps of the sixteenth century relies on an understanding of the craft tradition of the medieval master masons.

⁴¹ P.D.A. Harvey, *Maps in Tudor England* (London: British Library, 1993), p.98.

⁴² Gerbino and Johnston (2010), p.31-32.

Conclusion.

On February 1st, 1547, John Rogers reported to William Paget, a trusted Privy Councillor of the late Henry VIII, of the works proceeding at Boulogne. He writes of a new fortification called the “young man” which is to be built as a way of connecting existing defensive works by providing covering fire over a patch of deadground (see fig. 1). In this letter Rogers states,

After my duty considered, it may please your mastership to understand that within the young man I have traced or staked forth a little castle and, as I think, very fit for the same place if it may please the king’s majesty’s Council that it may be gone in hand withal, as Mr Dudley is not a little fain thereof; but till I know your pleasures it shall stay and nothing be done thereto. A plat thereof have I sent unto you by this bearer, every inch containing ten foot. [...] and then no doubt though the plat seem tedious to do, yet will it lightly be made and no great charge – neither shall it let any other work.¹

Rogers tells Paget that he has “traced and staked forth” the shape of the new building on the ground, but that despite the fact that it is “tedious to do”, he has also drawn a plat of the site with a scale wherein “every inch” contains “ten foot.” The full-scale image, staked and drawn out on the earth using cord, is used by Rogers to develop his design. The scale plan allows the Privy Councillor in Whitehall to see the works, potentially challenge their design, suggest emendations, and store a record of the authorised design at a site of a central bureaucracy. This passage works as a good summary of the history of the local map described in this thesis. It is evidence of how, as late as 1547, what is perhaps the oldest form of architectural design drawing - that of laying out a proposed design on the earth - was being used alongside a form of representation that had been pioneered by Rogers in the last decade. Medieval full-scale design techniques were clearly still being used alongside paper plats drawn in a fixed numerical ratio of one “inch” to “ten foot” beyond the end of Henry’s reign. A substantial part of this thesis explores the relationship between the techniques of architectural drawings developed during the Middle Ages, and the plats made

¹The National Archives, MS SP 68/13, cited in L.R. Shelby *John Rogers : Tudor Military Engineer* (Oxford: Clarendon, 1967) p.69.

during Henry VIII's reign. This research means that map historians no longer need rely on an unknown continental source to explain the innovations in early Tudor mapping, for it is reasonably certain that the sixteenth century maps were constructed using the skills of a medieval craft tradition still taught to masons like Rogers and Lee in the 1520s and 1530s.

Roger's letter to Paget also makes it clear that he began the work by designing the shape of the fortification on the earth and made the paper plat sent to Paget after the design had already been laid out using stakes and string, even "though the plat seem tedious to do." Roger's plat has not survived but he himself describes the numerical scale of this image, and it would probably have looked something like the technical drawings that Rogers made of fortifications at Guines, Hull and Ambleuse. Chapters two and three of this thesis examine the pictorial plats made for patrons during the fifteenth and sixteenth centuries and question why these plats begin to incorporate the technical idiom during the 1530s. It is clear from Rogers' letter that even in 1547 paper plats were still being made in response to the demands of the royal administration, and this evidence would suggest that from the first use of the pictorial plan in the mid-1400s through the incorporation of technical drawing into on-paper representation in the 1530s and right up to Henry's death, paper plats were made in response to the changing demands of patrons. Yet wider evidence examined in this thesis suggests that even if full-scale drawings were capable of setting out the military designs, scale plats begin to bear the burden of design in planning the King's royal palaces and apartments in the 1530s. Henry VIII's demands for increasingly complex suites of privy chambers and his own willingness to learn how to use the paper plans of his apartments, shift the balance in the relationship between patron and builder, so that the plats made for patrons are active proposals rather than passive records of a verbally agreed design. The changing function of paper drawings can be put down to the way in which Henry radically alters the interaction between patron and builder, for his masons are forced to respond to Henry's demands with increasingly innovative on-paper solutions that more accurately and more consistently portrayed their architectural subjects and, furthermore, allowed the King to work on the paper plats as design drawings, criticising, altering, and re-drafting images before work began. Looking closely at the letters that surrounded the abandonment of Boulogne in 1545, reveals that Henry forcefully claimed design authority over his works and established a system whereby design drawings were circulated between Whitehall and the construction sites around the Boulonnais, so that all emendations to the King's designs

made on site were checked by the King at Whitehall before being built. This system clearly survived the King's death and as the 1547 letter makes clear, Rogers continues to make plats for the new King's councillors before construction is begun. However, this letter also provides intriguing evidence that the medieval techniques continued to be used: paper drawing allowed the design to take place through a system of correspondence with Whitehall, though in select instances the design process was begun on the earth.

From the 1530s onwards, the map began to be used by the privy councillors who conducted the King's day-to-day affairs, which, in the 1540s, involved the management of a nationwide fortification programme. Men like William Paget (the recipient of Rogers letter cited above) continued to have an important role in government into the reign of Mary I, and were probably introduced to the function and use of the map through the King's insistence that all designs were passed back through Whitehall in the form of paper plats. The letter to Paget after the King's death makes it clear that the use of the map by these administrators continued immediately after the King's death. However this state of affairs does not continue and the reign of Henry VIII marks the high point of state controlled mapping in the sixteenth century.

The history of the local map outlined in this thesis is one of increased specialisation. As the masons made maps that responded precisely to the demands of the royal administration, maps were used more extensively by the King and his councillors and, in an ever tightening circle, the further and increasingly specialised demands were relayed back to the King's map-makers. The long-term effect of this reciprocal relationship is the incorporation of the map into the workings of a Royal administration attempting to control territorial and architectural disputes in remote areas. However, there is nothing innate about the map that would lead it to become increasingly concerned with the accurate representation of distance and direction. During the reign of Henry VIII the map does become increasingly concerned with portraying an accurate representation of the dimensions of its subject, and it is extensively used by the King and his councillors. However, looking at the material history of how this occurs ought to suggest to a reader that this process was not inevitable. Similarly, looking at how the local map was disassociated from the royal administration in the period after Henry's reign and how the various forms of pictorial, literary, imaginative and satirical maps were reclaimed by a later period is not a

study of changes that are innate to the map, but is simply an exploration of a range of different contextual factors.

One of the consequences of Brian Harley's interpretation of Foucauldian theory has been to establish the measure of state control as an objective referent with which to examine the progression of maps over time. A focus on the material contexts of maps challenges these certainties. Citing Denis Cosgrove, Jess Edwards writes that "When we shift our focus from product to process, we soon see the 'aesthetics of closure and finality dissolve.' [and] [...] we should tread very carefully indeed before reading maps as 'cultural images' rather than local interventions in material social processes."² These critics are responding to the "aesthetic," in this context, abstract and theoretical, idea that state makes up an all-containing system the basic structure of which cannot be subverted by those within the system, but can only be reinforced through apparent transgression. Yet when we move from "product to process", when we move from examining maps as a complete form, to analysing maps as part of a complex social interaction that draws on a history of craft skills, the "aesthetics of closure" does indeed begin to dissolve among a complex history of fluctuating, inconsistent or historically conditional map use and interpretation. Given the complex and detailed historical evidence that a materialist history of the map can uncover, trans-historical arguments that use state control as a paradigm with which to evaluate everything else, can come to seem to be a simplification that draws attention away from the finer details of historical process and skews the approach to a period towards the discovery, once again, of the structures of state control.

In Harley and Woodward's 1987 *History of Cartography* the authors working together offer four criteria with which "to summarize the basic scope of the *History of Cartography*." The first of these criteria is the acceptance of a new definition of what constitutes a map. "Maps are" they state, "graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world."³ Beyond the

² Jess Edwards, *Writing, Geometry and Space in Seventeenth-Century England and America : Circles in the Sand* (London: Routledge, 2006), p.7.

³ Brian Harley and David Woodward, 'Preface', in *The History of Cartography: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean, Vol 1*, ed. by J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987), (pp.xv-xxi) p.xvi.

acceptance of this definition, three further criteria of the scope of cartography are given in the following passage:

second, commitment to a discussion of the manifold technical processes that have contributed to the form and content of individual maps; third, recognition that the primary function of cartography is ultimately related to the historically unique mental ability of map-using peoples to store, articulate, and communicate concepts and facts that have a spatial dimension; and fourth, the belief that, since cartography is nothing if not a perspective on the world, a general history of cartography ought to lay the foundations, at the very least, for a world view of its own growth.⁴

In terms more familiar from this thesis, Harley and Woodward are essentially describing an approach that is concerned with the changing forms of the map and an exploration of how this change is dependant on both the technical skills of the map maker and the use of the map as part of social interaction. The last of their criteria gestures towards the fact that a history of the map ought to work with a methodological position that, if applied universally, would allow the subject to progress. This thesis has not intentionally used Harley and Woodward's description of the "basic scope" of a history of cartography but it provides a useful way of evaluating both my methodology and the details of its historical research and argument. When considered in this way, my thesis makes it clear that these factors (barring perhaps the last, which is of a different order and is considered last) are themselves all interdependent.

Harley and Woodward offer a broad definition of what constitutes the map that invites us to think well beyond the map as a representation of landscape concerned with the accurate portrayal of distance and dimension. My own work exploits the liberating breadth of this definition while contextualising its arguments that modern distinctions between the architectural plan and the topographical map cannot be applied in the sixteenth century. This study challenges the historically anachronistic distinctions between architectural and topographical drawings, between plats of things and plats of landscapes, by suggesting that the skills used to make both of these forms develop out of a medieval craft tradition

⁴ Harley and Woodward (1987), p.xviii.

responding to the demands of the King. This discussion is committed to an examination of the “technical processes that have contributed to the form and content of individual maps,” and my own methodological position seeks to incorporate an analysis of the map as part of a social interaction with detailed research and analysis of the graphic skills of the medieval master mason and the adaptation and use of these graphic techniques in sixteenth century maps.

The use of these craft skills cannot themselves be separated from what Harley and Woodward call, “the primary function of cartography” which is, in their definition, “ultimately related to the historically unique mental ability of map-using people to store, articulate and communicate concepts and facts that have a spatial dimension.” Local maps were used as a method of communicating concepts and facts between the patron and his craftsman and chapters two and three of this thesis are largely concerned with portraying the changes that are produced in a series of maps by their situation within a process of communication between two parties. Situating the map as part of a social communication in this way complicates the discussion of the technical processes used to make the map itself, for it was only through the social interaction between patron and craftsman in the sixteenth century that the technical ability of the medieval master mason is expressed in new and innovative ways. Splitting up the basic criteria of the history of cartography allows us to see how the social and the technical concerns of the history of the map cannot be separated or considered in isolation.

The fourth and last of Harley and Woodward’s points is separate from the first three, the critics finally stating that a work in the history of cartography “ought to lay the foundations, at the very least, for a world view of its own growth.” My own work uses a methodology that seems to me to offer a foundation for the future growth of the history of cartography. It draws on the premise that because “each map is as comprehensible and logical to its users as any other”⁵ an analysis of Henrician maps needs to focus on how maps were used and understood by people within Henrician England and attempt to move beyond evaluating the historical map using modern critical frameworks. The archival evidence drawn together by my research suggests that there is continuity to local map use during the Henrician period. As far as we can tell from the extant archives, local maps were

⁵ Jerry Brotton, *A History of the World in Twelve Maps* (London: Allen Lane, 2012), p.14.

used by a relatively small group of people who selected or rejected types of maps or new modes of representation according to the shared criteria of the group. The historically specific demands and graphic skills of this map using community meant that over the period of Henry's reign, maps were made with an increased emphasis on accurately portraying the "distance and direction"⁶ of their subjects. However, it was not inevitable that this study would find that local maps were used by a single social group in increasingly consistent way and focusing on contemporary map use and interpretation creates a a space for research into historical map using communities in which types of map were being used within a variety of different interpretive frameworks and in a range of contexts unconnected to modern ways of using and making maps. Yet we seriously limit the history of cartography if only the discontinuous and fragmented history of a period has the ring of truth, just as we limit the discipline if the technical aspects of a map are de-emphasised in favour of social and cultural research. If the history of cartography as a distinct discipline is to grow, then it needs to remain focused on the use and interpretation of maps within their historical periods and places.

⁶ Gerald R. Crone, *Maps and Their Makers: An Introduction to the History of Cartography*, 1st ed. (London: Hutchinson University Library, 1953), p.xi.

Illustrations

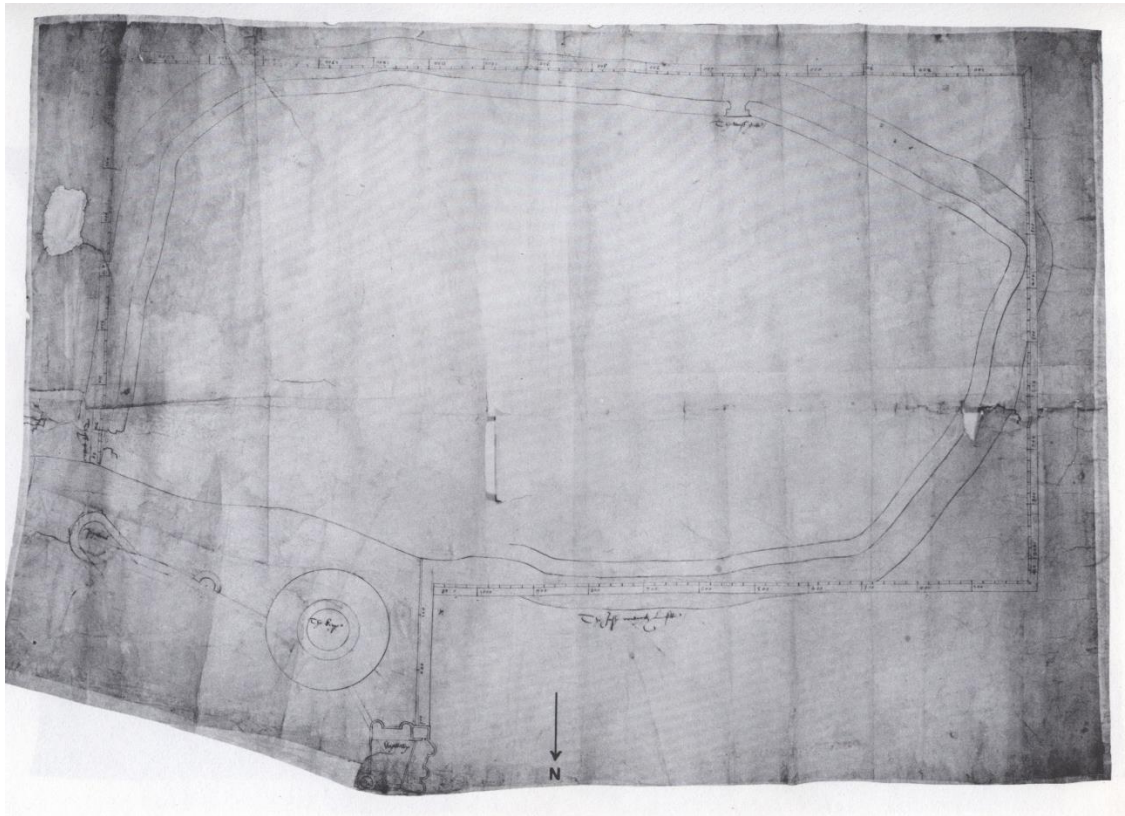


Fig. 1. Plat of Guines. London, British Library, MS Cotton Augustus I Supp. 14. (101×71.5cm). Reproduced from: Lon Shelby, *John Rogers, Tudor Military Engineer* (Oxford: Clarendon, 1967), plate 1.

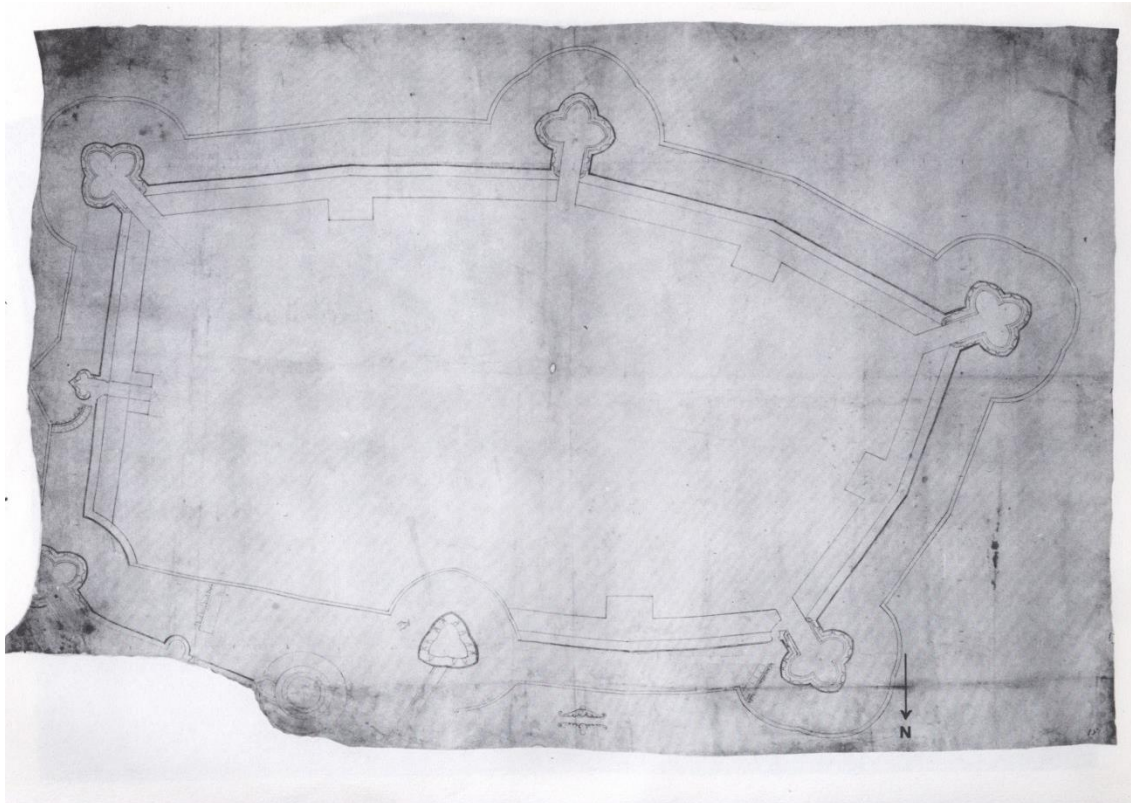


Fig. 2. Plat of Guines. British Library, MS Cotton Augustus I.ii. f.51. (98.5×67cm) Reproduced from Shelby (1967), plate 2.

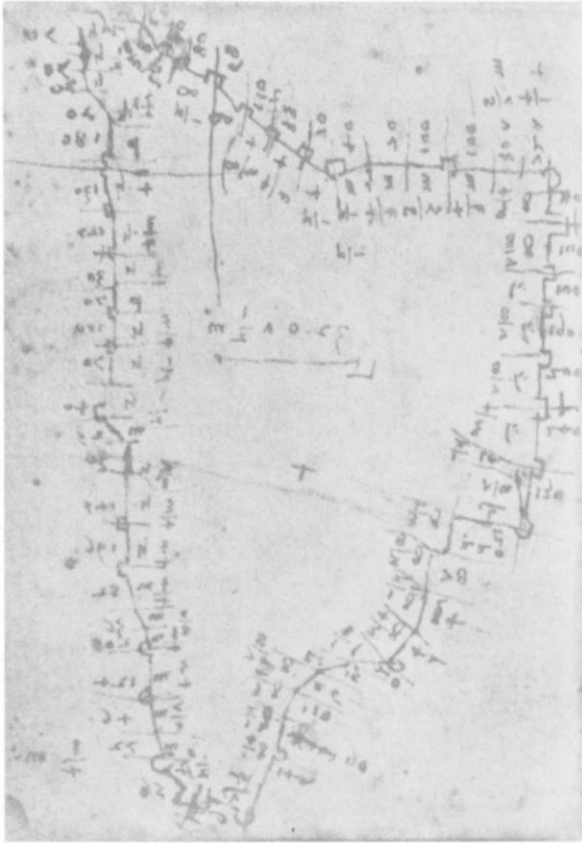


Fig. 3. Leonardo da Vinci, Survey of the City Walls, Cesena, c.1503. Reproduced from: John Pinto, 'Origins and Development of the Ichnographic City Plan', *Journal of the Society of Architectural Historians*, 35 (1976), pp. 35-50, (p.41), citing: *Les manuscrits di Leodnardo De Vinci, Manuscrits G, L & M de la Biblioteque de l'Institut* (Paris, 1890).

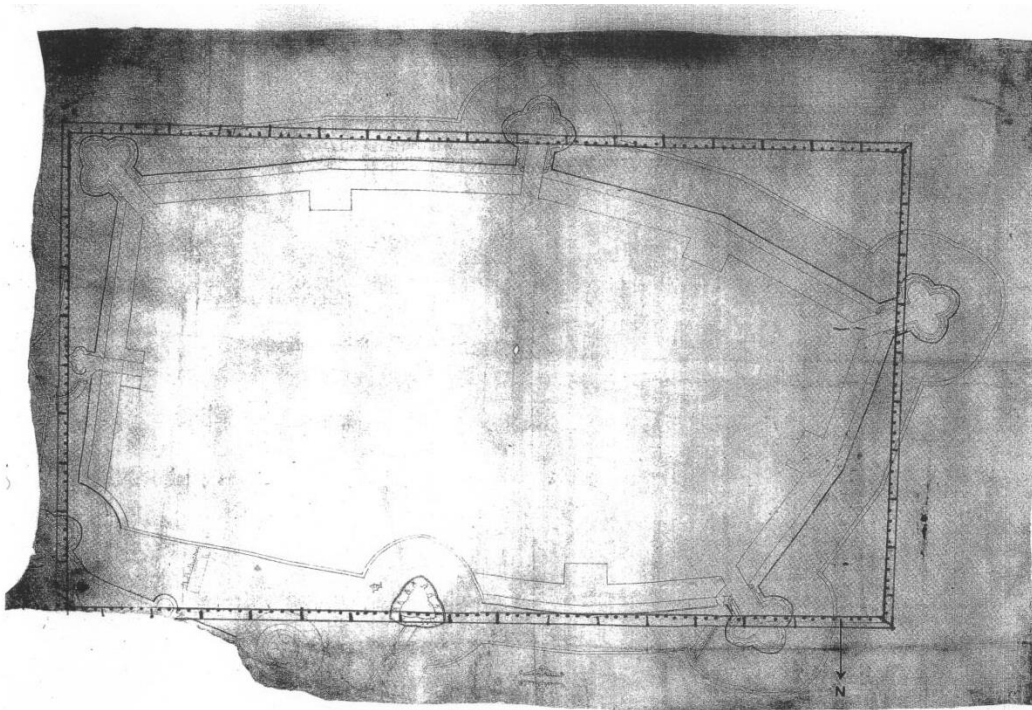


Fig. 4 Copy of fig 2, with gold scale boundary emphasised in black.

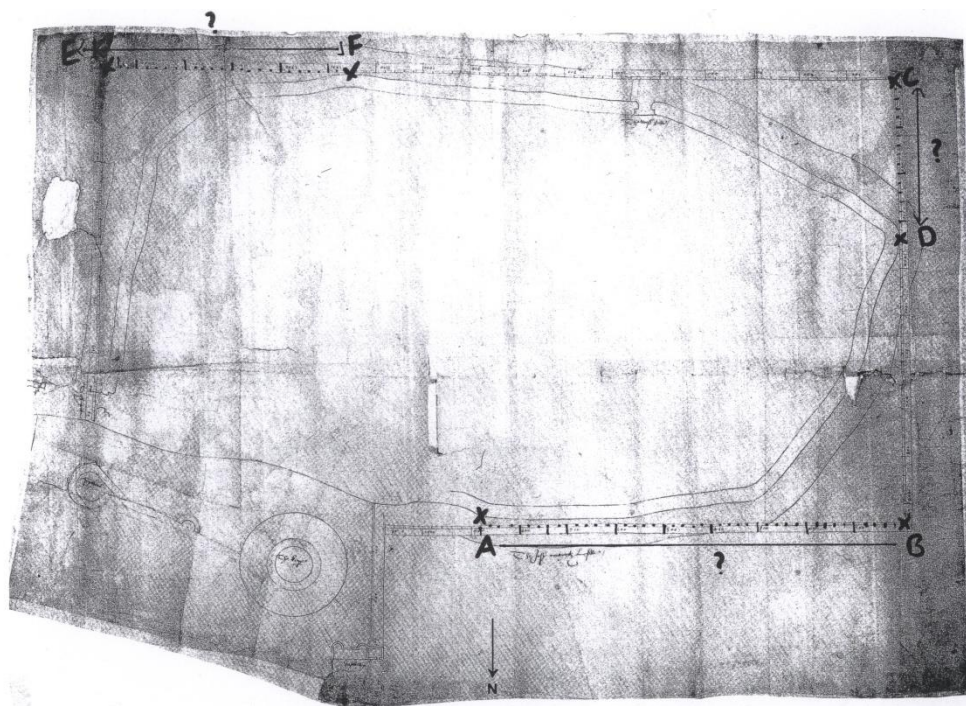
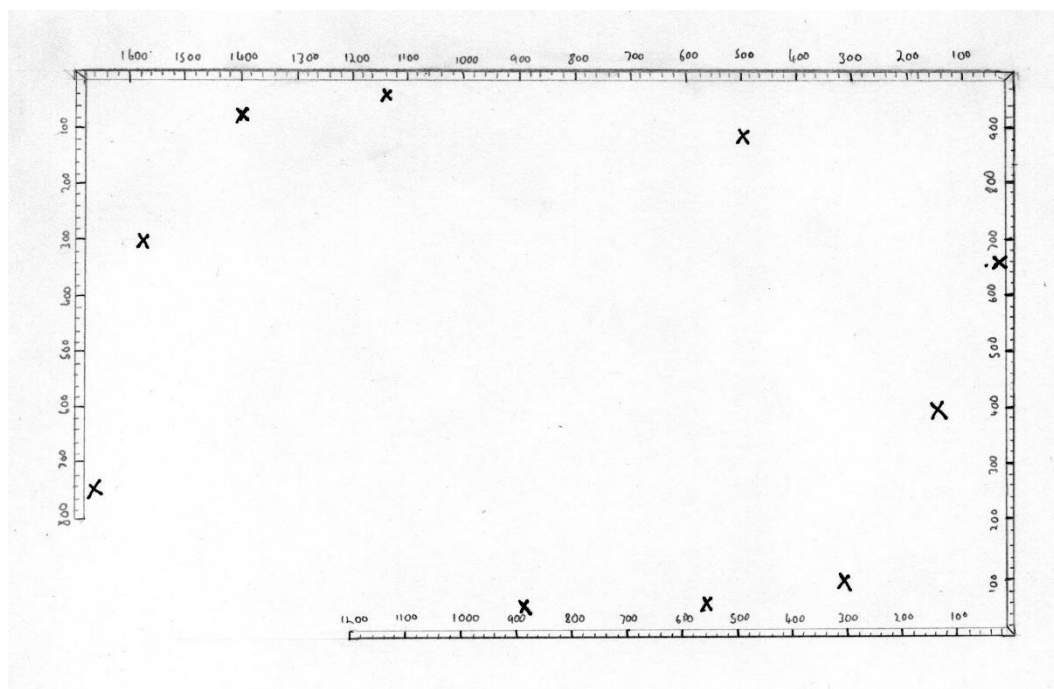
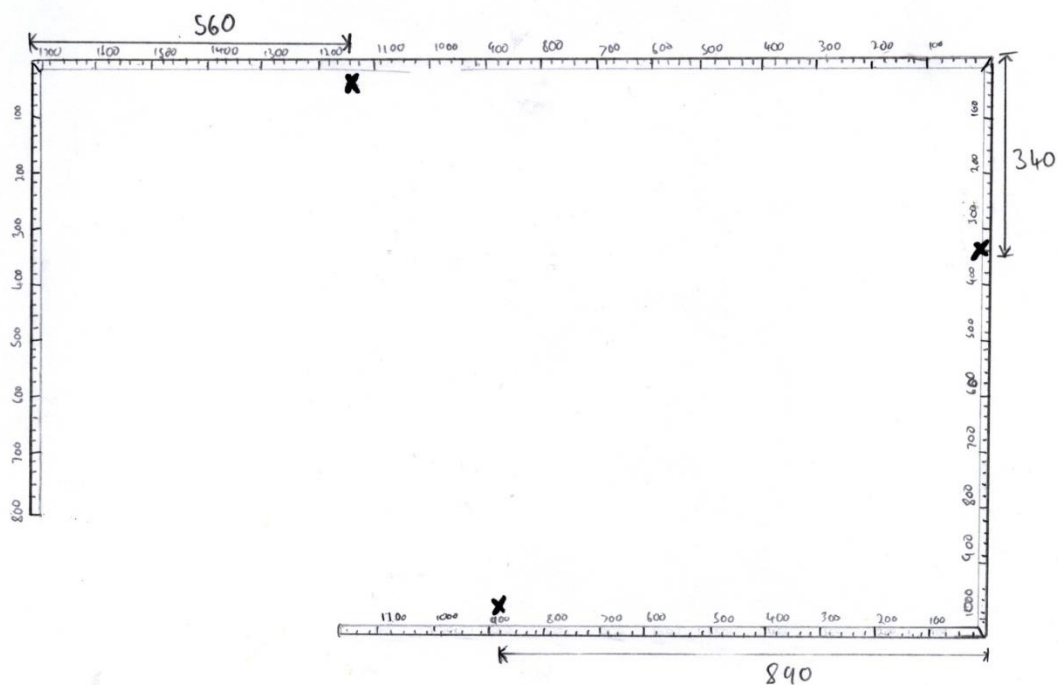


Fig. 5 Copy of Fig 1. With emphasis given to the points that could have been measured by Rogers along the castle wall in order to give him three starting points on his page. Fig 6 is a representation of these three points, within the scale boundary.



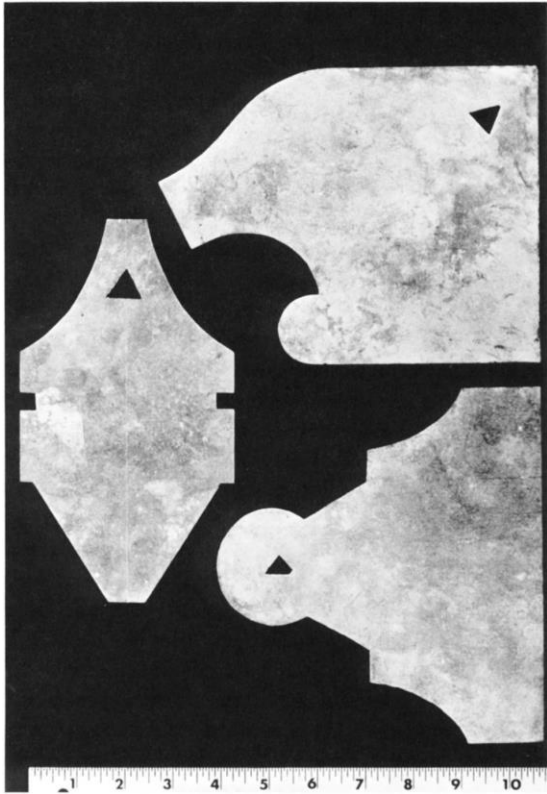


Fig. 8. Twentieth century masons' templates cut from zinc sheets at the Bath and Portland Stone Company, Bath, England. Reproduced from Lon Shelby, 'Medieval Masons' Templates', *Journal of the Society of Architectural Historians*, Vol. 30, No. 2 (May, 1971), pp.140-154 (p.141)



Fig. 9. Portrait of Master Mason Herman tom Ring. Note the templates in the top right hand corner. Reproduced from: Shelby (1971), pp.140-154 (p.142).

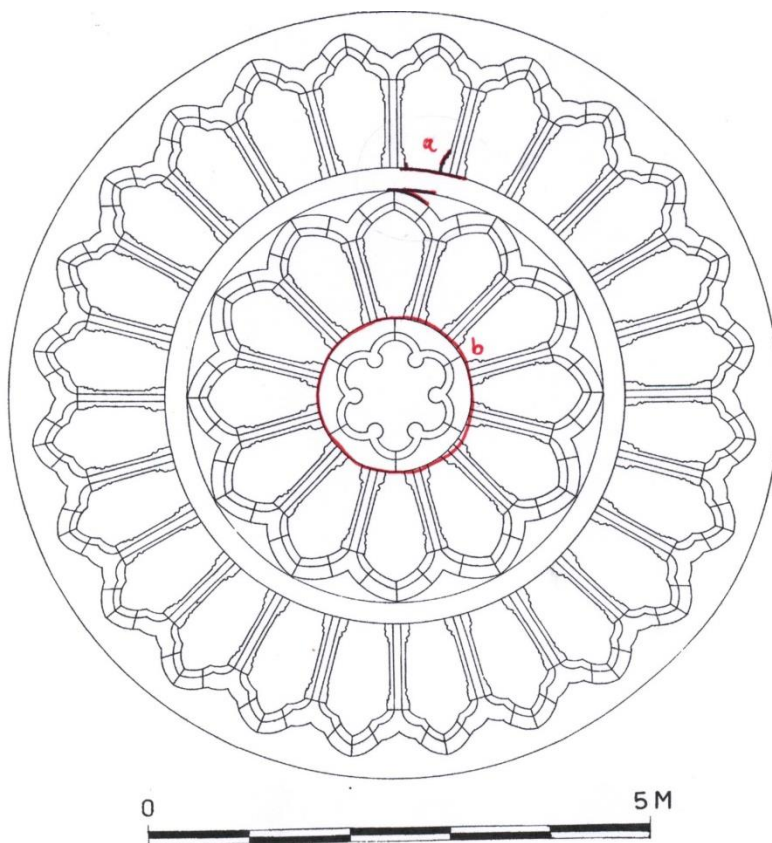
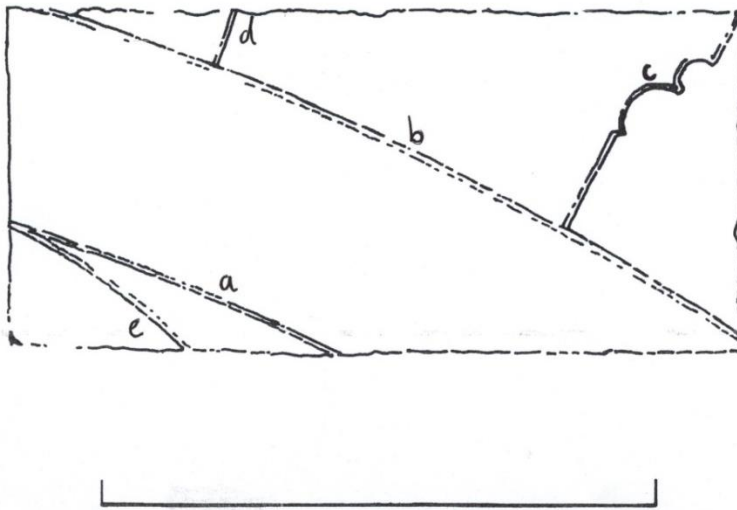


Figure 11. Reconstruction of the rose window of Byland abbey. The lines emphasised and labelled “a” represent the section of the window portrayed on the slab of the tracing floor found in fig. 10. The central roundel labelled “b” was drawn on the interior wall of the abbey and has survived. Fig 12 shows the placement of this drawing on the section of the abbey wall that still stands, fig 13 Fig. 13 is a photograph of the surviving drawing of this section of the window. Reproduced from: Harrison and Barker (1987), p.144.

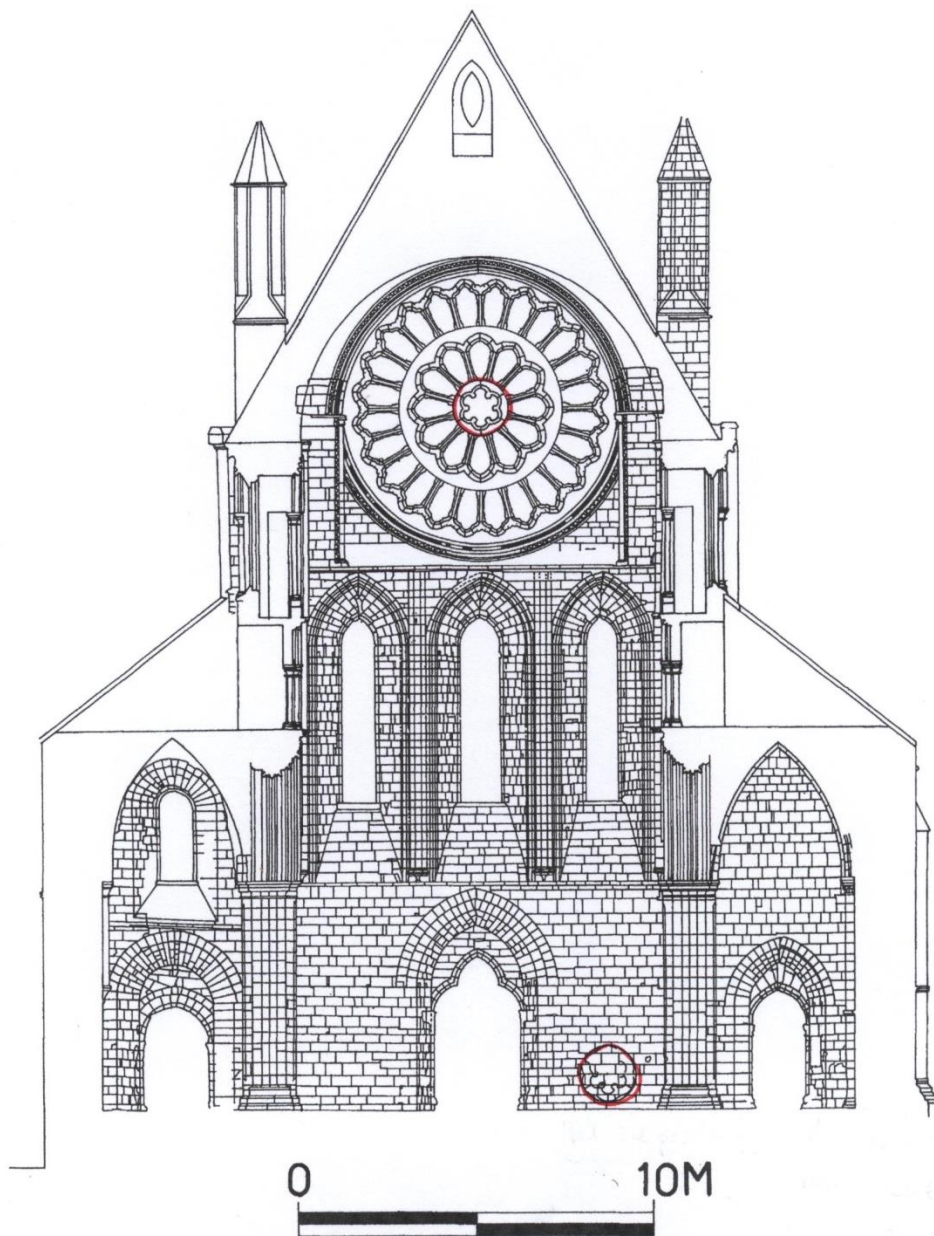


Fig 12. Harrison and Barker's reconstruction of the interior wall of the west front of Byland abbey. (based on the photogrammetric drawing produced for English Heritage by the York Photogrammetric Unit). Emphasised in red are both the placement of the central roundel within the window, also the placement of the extant drawing of this feature on the wall itself. Reproduced from Harrison and Barker (1987), p.140.

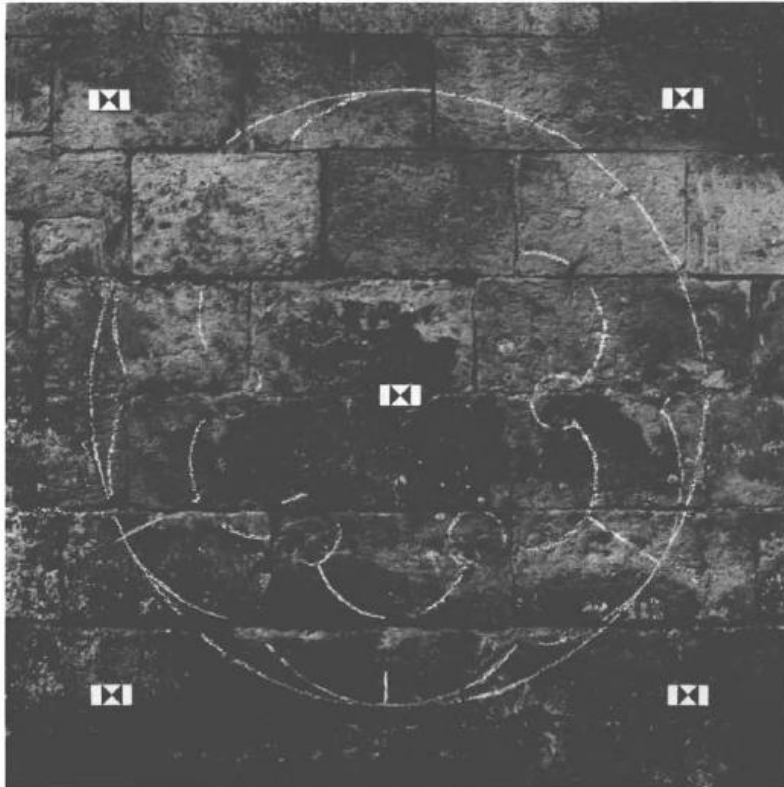


Fig 13. Photograph of the drawing incised into the wall of the west front. The incisions into the stonework have been emphasised with white chalk. Reproduced from Harrison and Barker (1987), plate xxx.

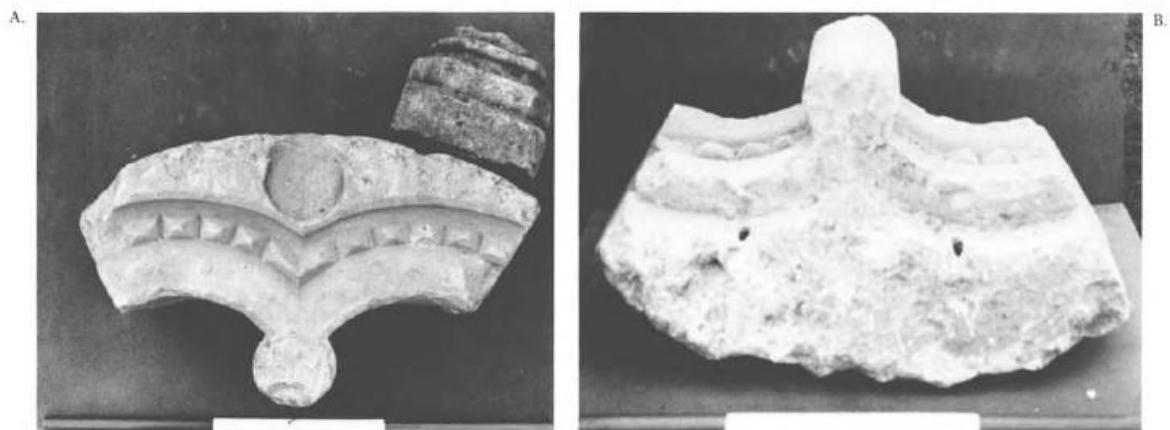


Fig. 14. Two photographs of the external and internal face of the of the surviving section of the central roundel. When placed against the drawing photographed in fig 13 this piece is clearly one sixth of the drawing, the outer circumference of which has visibly been divided into six parts. Reproduced from Harrison and Barker (1987), plate xxxi.

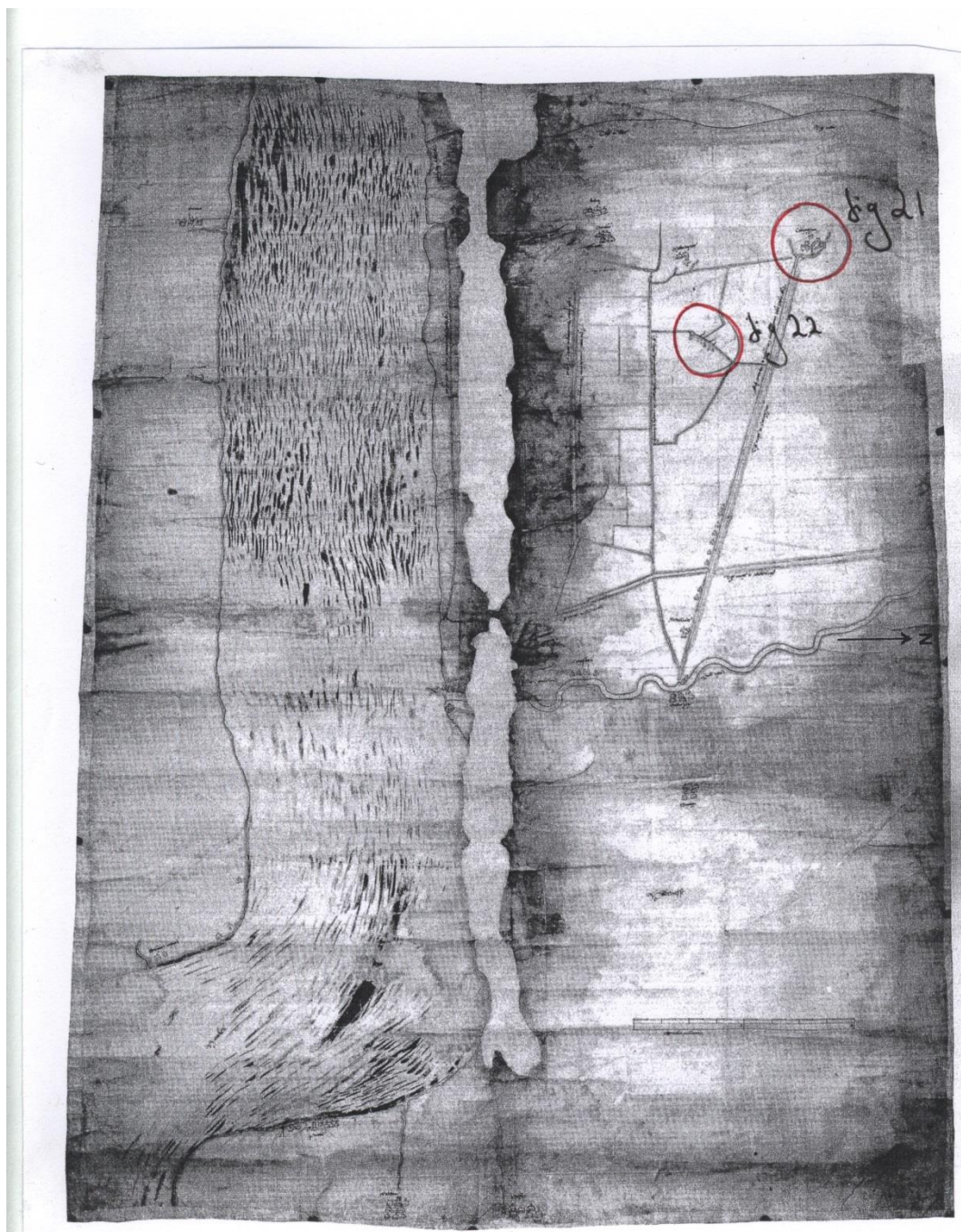


Fig. 15. Plat of the waterways around Hull. British Library, MS Cotton Augustus I. Supp. 20. (99×132cm).
Reproduced from Shelby (1967), plate 9.

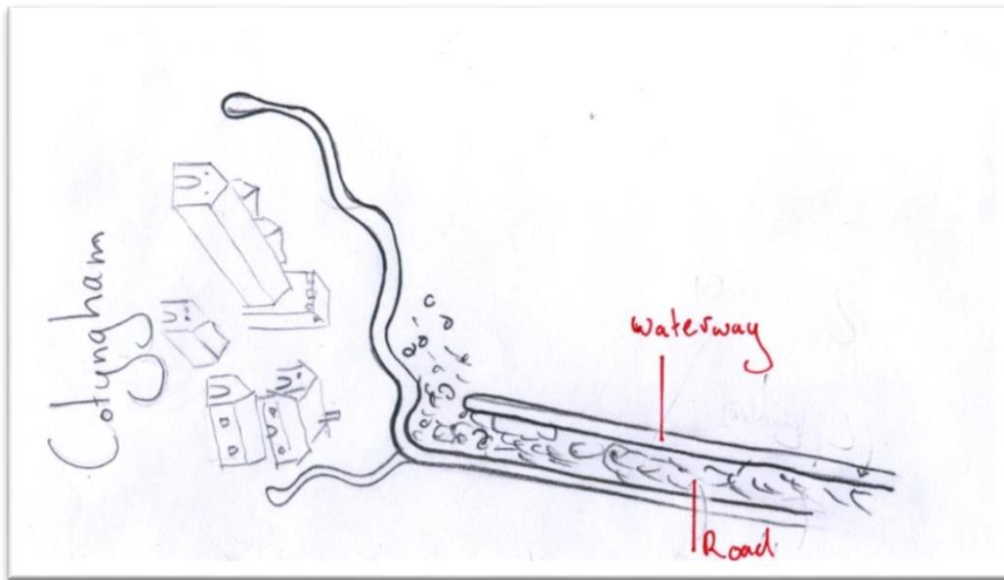


Fig. 16 Freehand reproduction of the waterway around Cotyngam, showing the use of texturing to counterintuitively represent the road and the waterway, and the regular curves of the river around the village. Reproduced from: MS Cotton Augustus I. Supp. 20.

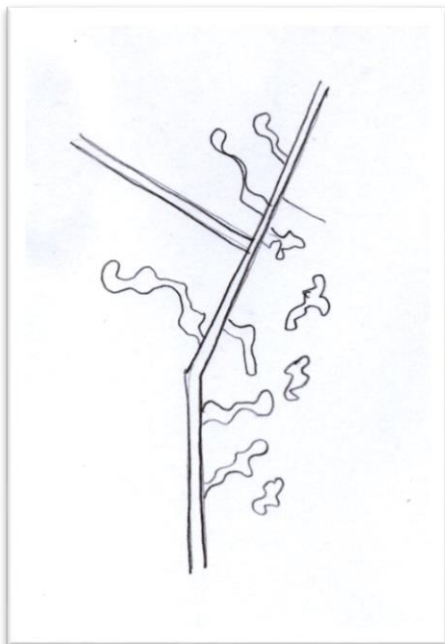


Fig. 17. Freehand reproduction of the springs represented at one section of the waterways. Labelled in fig. 15. Reproduced from: MS Cotton Augustus I. Supp. 20.

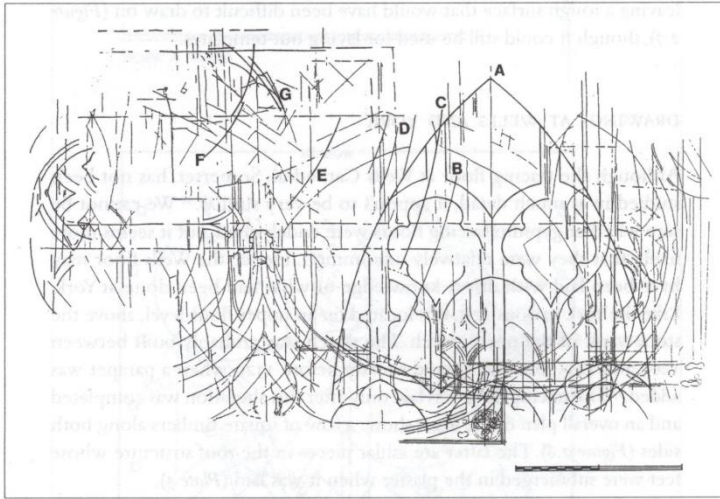


Fig. 18. Reproduction of some of the major drawings on the tracing floor of York cathedral. The most complete design is labelled with an a. the other letters refer to examples discussed by Pacey. Scale bar: 2m. Reproduced from Arnold Pacey, *Medieval Architectural Drawing; English Craftsmen's Methods and their Later Persistence c.1200-2700* (Stroud: Tempus, 2007), p.54.

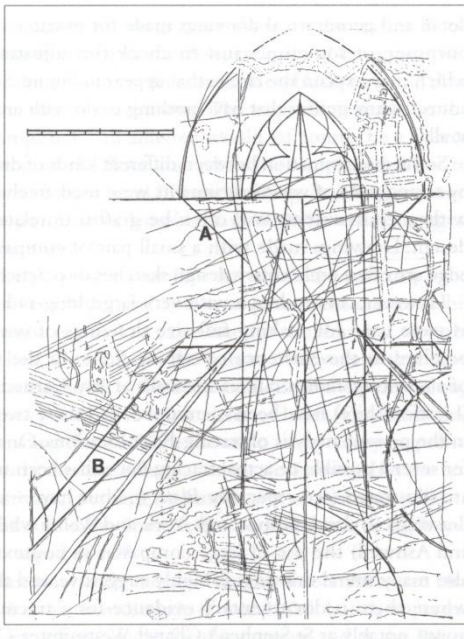


Fig. 19. St Mary's Church, Ashwell Hertfordshire. A reproduction of a drawing on a wall at the west end of the south aisle showing the pointed and cusped head of a narrow lancet window. The Plan of the window opening is also indicated, with the oblique line at A representing the external face of the splayed window jamb, and the three lines at B showing variant designs for the inner face. The scale bar is 100mm. Reproduced from Pacey, (2007), p.41



Fig. 20. Photograph of a detail of the tracing floor at Wells Cathedral, Somerset. The lines are clearly very faint however some of the boldest (for example the double curves seen running from the high centre to the lower right of the photograph) can be identified, and related to the features of fig. 21 which is a photogrammetric reproduction of this area of the tracing floor. Reproduced from Pacey (2007), plate 6.

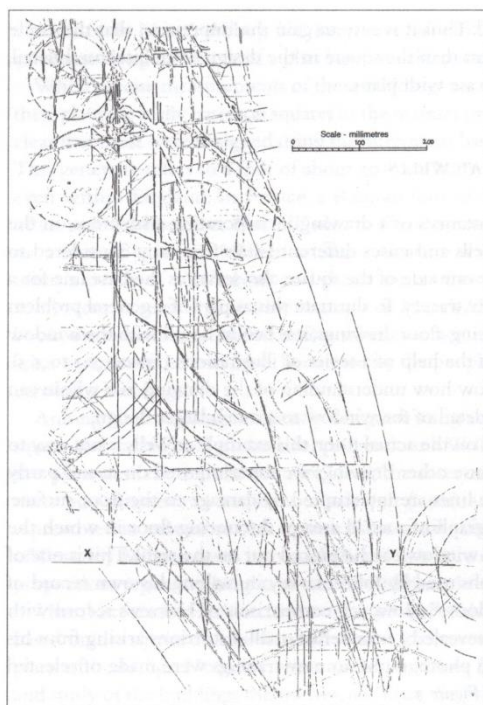


Fig. 21. Detail of the tracing floor seen in fig. 20 reproduced. Letters X and Y have been added to define the base line referred to in the text. Scale bar shows 200mm. Reproduced from Pacey (2007), p.66.

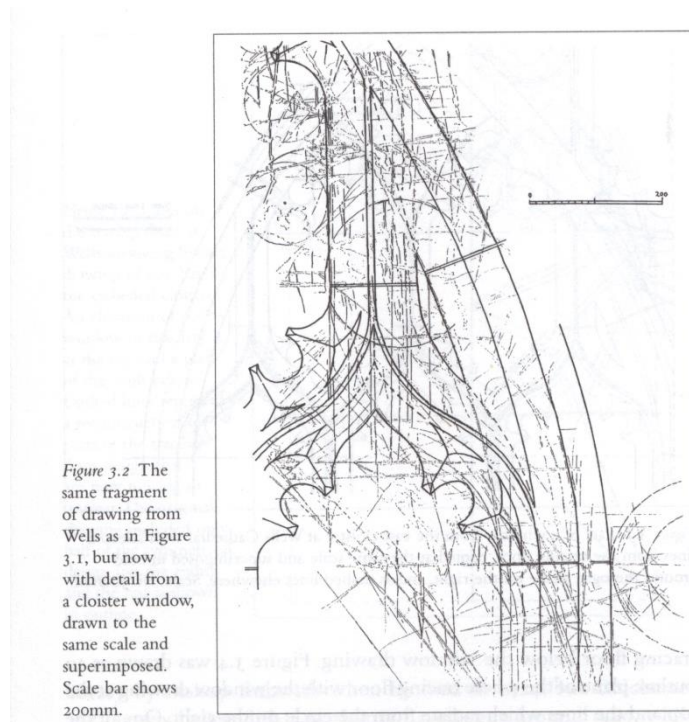


Fig. 22. The same fragment of the tracing floor with a detail reproduced from windows found in the east cloister of Wells Cathedral superimposed over the original designs. Scale bar shows 200mm. Reproduced from Pacey (2007), p.67.

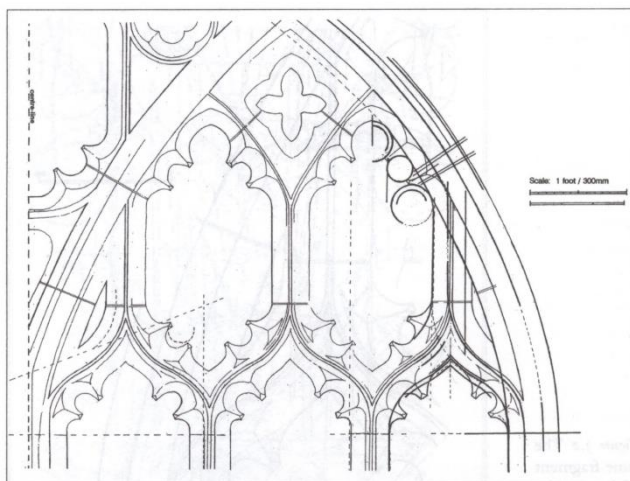


Figure 3.3 Part of a window from the east cloister at Wells Cathedral with selected lines from the tracing floor, copied at the same scale and superimposed in bold around the ogee shape on the right, and as dashed lines elsewhere. Scale: 1ft/300mm.

Fig. 23. A fuller drawing of the windows in the east cloister superimposed over selected lines from the wells tracing floor which have been emphasised in bold. The drawing clearly shows the relationship of the full-scale image to the existing window tracery. Scale: 1ft/300mm. Reproduced from Pacey (2007), p.68.

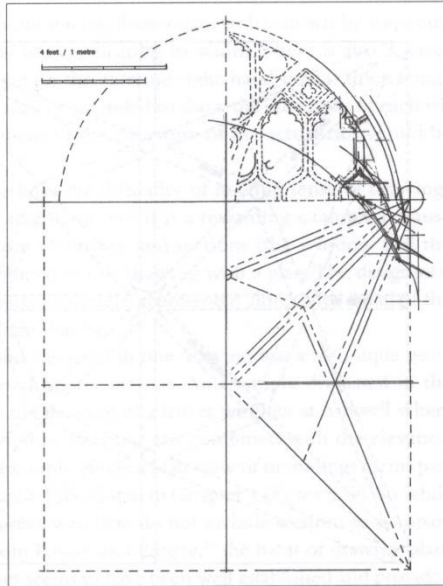


Fig. 24. Lines on the tracing floor overlaid with a combined image of the window tracery and a plan of the roof vault that survives above that tracery in the east cloister. (a simplified view of the roof vault is included as fig. 25) Both the tracery and the roof vault that fills the bay above it seem to have been set out using the same baseline. Solid lines represent marks that have survived on the tracing floor and dashed lines are reconstructions of part of the tracing floor design that are now missing or unclear. Upper scale bar: 4ft, lower: 1m. Reproduced from Pacey (2007), p.69.

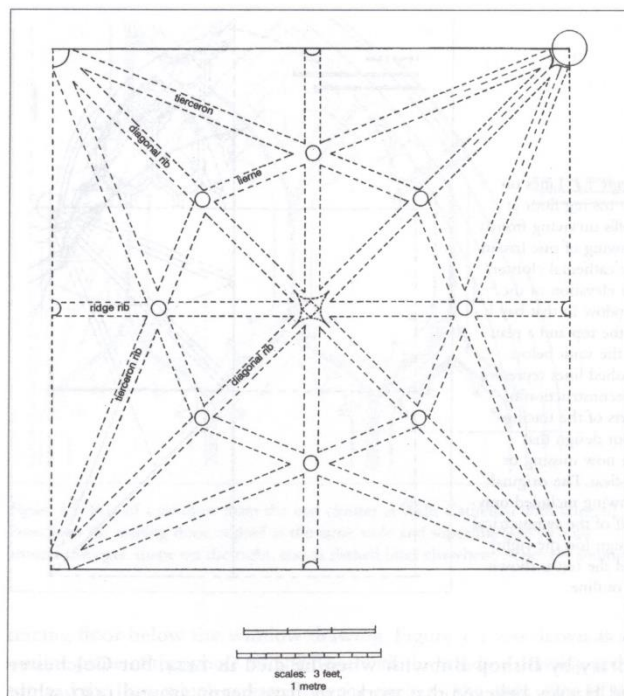


Fig. 25. A simplified plan of one bay of the roof vault in the east cloister. Upper scale bar: 3ft. Lower: 1m. Reproduced from Pacey (2007), p.70.

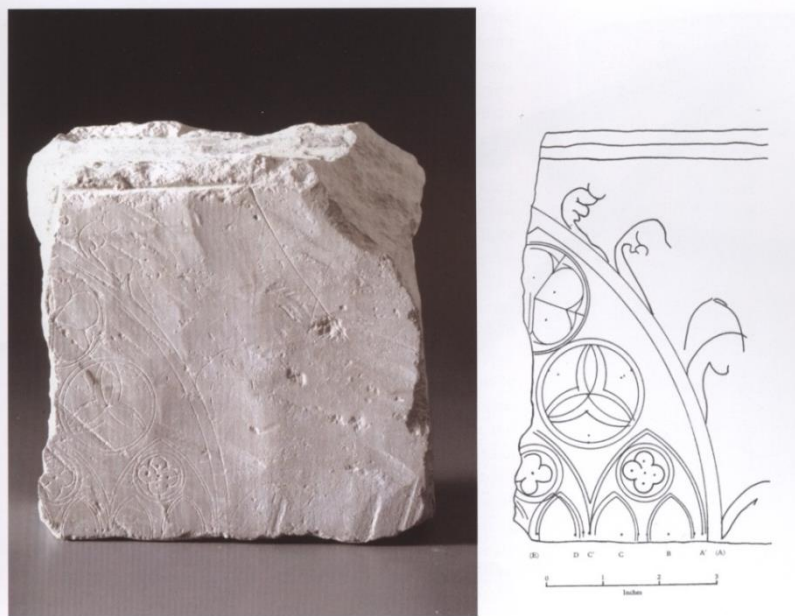


Fig. 26. A fragment of an incised window sketch from the chapel of the Hospital of St John the Evangelist, late thirteenth century. The line drawing on the right reproduces the incisions into the stone. Cambridge, University of Cambridge Museum of Archaeology and Anthropology, ac. no. Z 15088. Reproduced from: Anthony Gerbino and Stephen Johnston, *Compass and Rule; Architecture as Mathematical Practice 1500-1750* (New Haven, Conn.: Yale University Press, 2009), p.19.

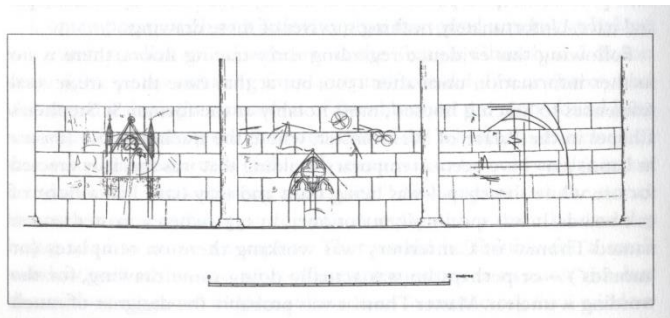


Fig. 27. Overall view of a group of drawings on the interior of the south wall of the Galilee Porch at Ely Cathedral. The drawings are divided into three sections by the detached shafts in front of the wall, and the window design shown in figure 28 is in the central bay. Scale bar: 2m. Reproduced from: Pacey (2007), p.38.

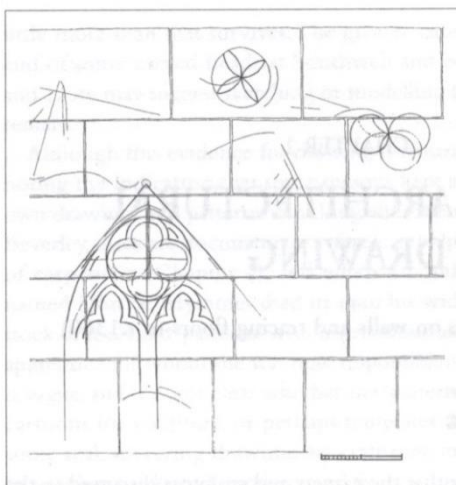


Fig. 28 Reproduction of a detail of fig. 27 showing a drawing of a window, c. 1250. The small drawing to the right showing two circles touching (with some other arcs) appears to be related to the design within the large circle at the top of the window, which was itself developed from pairs of touching circles. Scale bar is 200mm. Reproduced from: Pacey (2007), p.34.

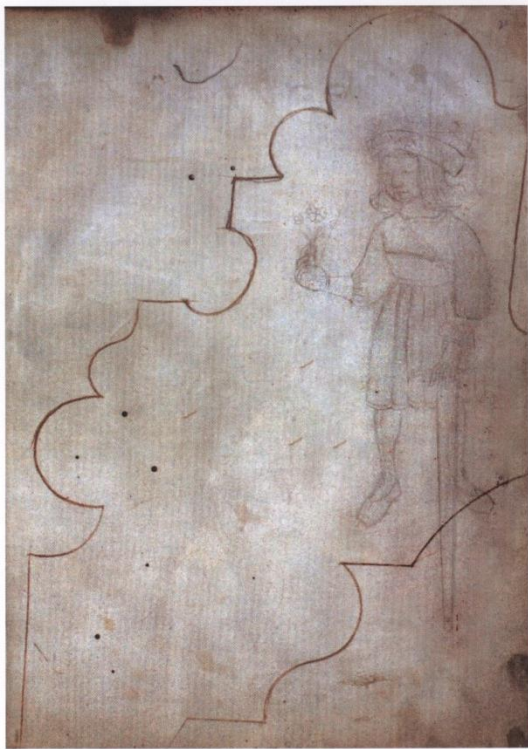


Fig. 29. Photograph of a drawing of a template for a moulding in the 'Pepys' sketchbook, in which the following drawings of window tracery are also located. Cambridge, Magdalene College, Pepys Library, MS 1916, f.21a. Reproduced from: Gerbino and Johnston (2009), p.22.

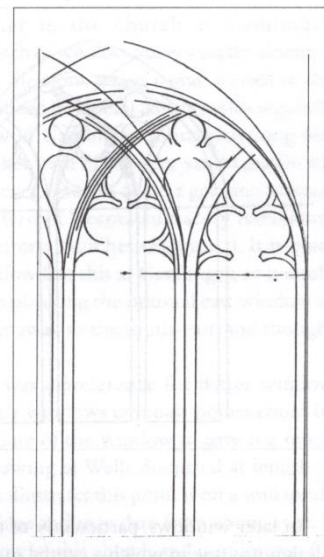


Fig 30. Reproduction of a drawing of window tracery found in the Pepy's sketchbook. The original is too faint to be seen. Reproduced from Pacey (2007), p.127.

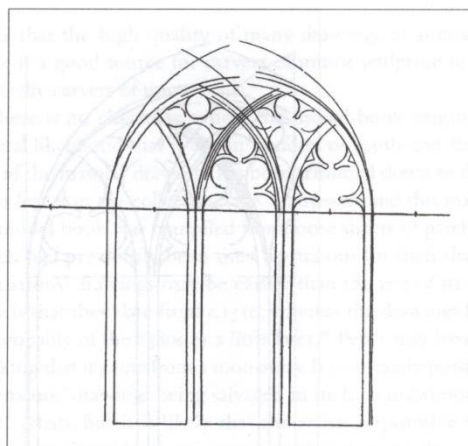


Fig. 31. Reconstruction of the incomplete sketch reproduced in fig. 30. The original page has been trimmed, presumably when the pages were compiled for binding. The missing curves have been added, as has a base line for the tracery. Reproduced from: Pacey, (2007), p.128.



Fig. 32. Photograph of the doorway at St Stephens Church, Bristol. Reproduced from Pacey (2007), plate 12.

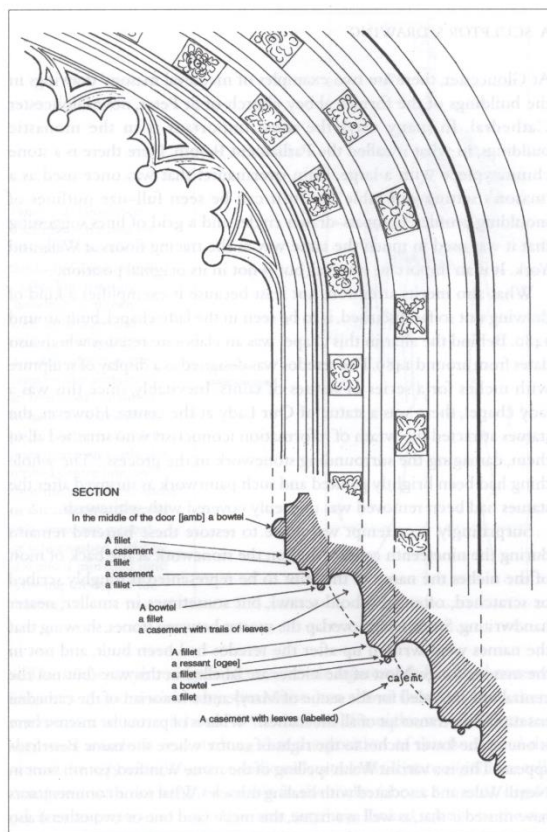


Fig 33. Detail of the doorway photographed in fig. 32. Note how the cross section of the moulding around the doorway matches the image that was probably sketched out by Benedict Cross in William Worcestre's notebook and reproduced in figure 33. The names included in this illustration are those quoted by Crosse, and recorded by Worcestre in his notes on the drawing (spellings are modernised). Reproduced from: Pacey (2007), p.121.

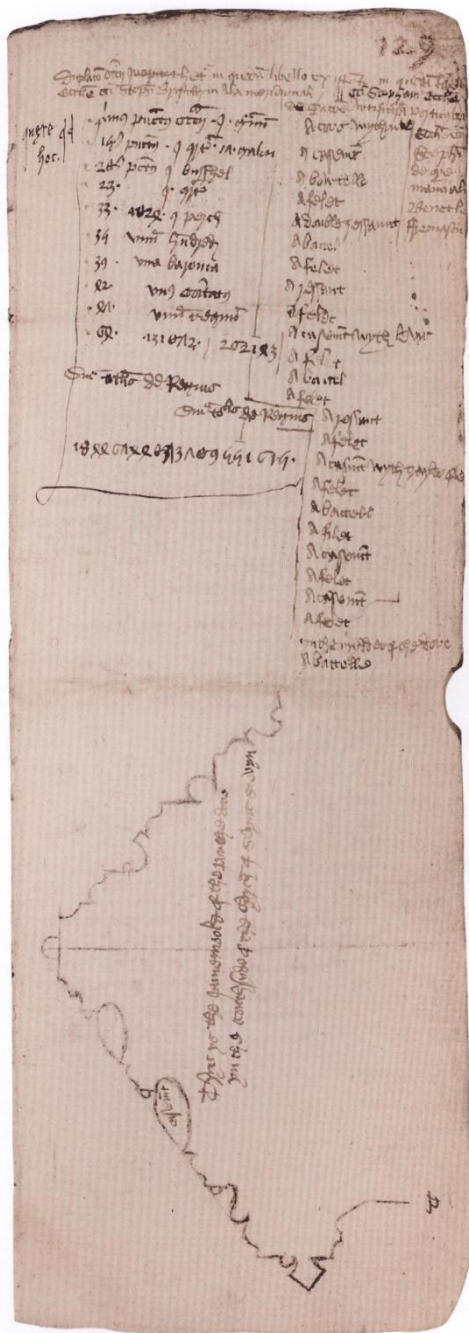


Fig. 34 Photograph of the drawing of the moulding of the doorway at St Stephens made in William Worcestre's notebook. Cambridge, Corpus Christi College, Parker Library, MS 210, f.129. Reproduced from: Gerbino and Johnston, (2009), p.21.



Fig. 35. Photography of the main hall at Hampton Court, before they were restored Roger's carvings would have been found on either side of the doorway at the far end of the hall and leading to the watching chamber.



Fig 36. Detail of restored becket that replaced Roger's on the doorway between the great hall and the watching chamber.



Fig. 37. Detail of one of the surviving Tudor becketts on a doorway into the great hall at Hampton court (it is situated directly behind the camera's view in fig. 35.).



Fig. 38. Detail of another of the surviving Beckett's into the Great Hall. This may have been carved by Roger's though this is not specified in the works accounts, which state that Roger's was commissioned to specifically carve the work around the doorway seen in fig. 35. This beckett has clearly suffered the kinds of wear which led to the restoration of the other becketts.

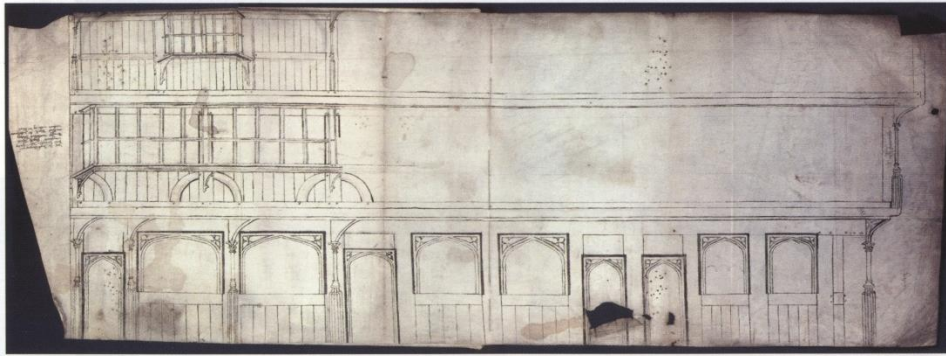


Fig. 39. A photograph of a drawn elevation of a timber frame house. Worcestershire, Worcestershire record office, Bishop Ghinucci's register, MS 716. 093, binding. (106cm×38cm). Reproduced from: Pacey (2007), plate 29.



Fig. 40. The reverse side of the parchment photographed in figure 36, showing a cross section of the same building. Worcestershire, Worcestershire record office, Bishop Ghinucci's register, MS 716. 093, binding. Reproduced from: Pacey (2007), plate 30.

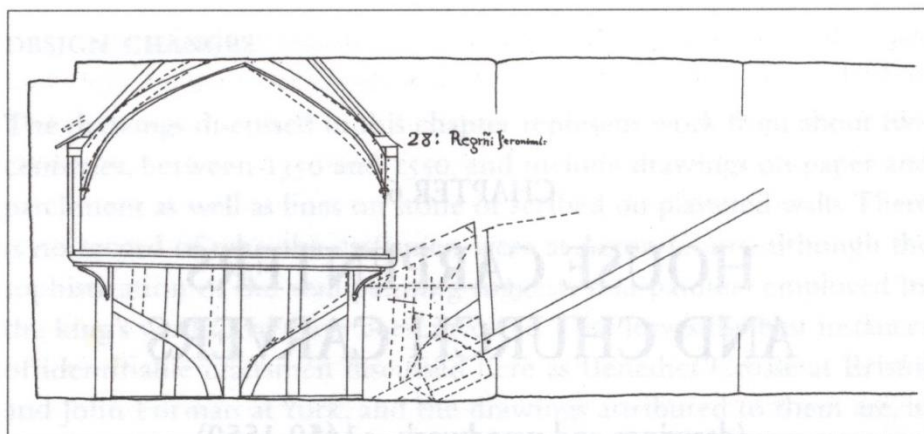


Fig. 41. A modern reproduction of the faint lines photographed in figure 40. Reproduced from: Pacey (2007), p.140.



Fig. 42. Photograph of drawing by William Vertue, an elevation the bays of the chantry chapel of Bishop Richard Fox, Winchester Cathedral, c.1513-1518. London, Royal Institute of British Architects, Smythson MS SA 51/2. Reproduced from: Gerbino and Johnston (2009), p.29



Fig. 43. Combined elevation and plan view of a canopied niche or pedestal. It is of unknown date but has been attributed to William Vertue on stylistic ground. London, Royal Institute of British Architects, Smythson MS IV/2. Reproduced from: Gerbino and Johnston (2009), p.30

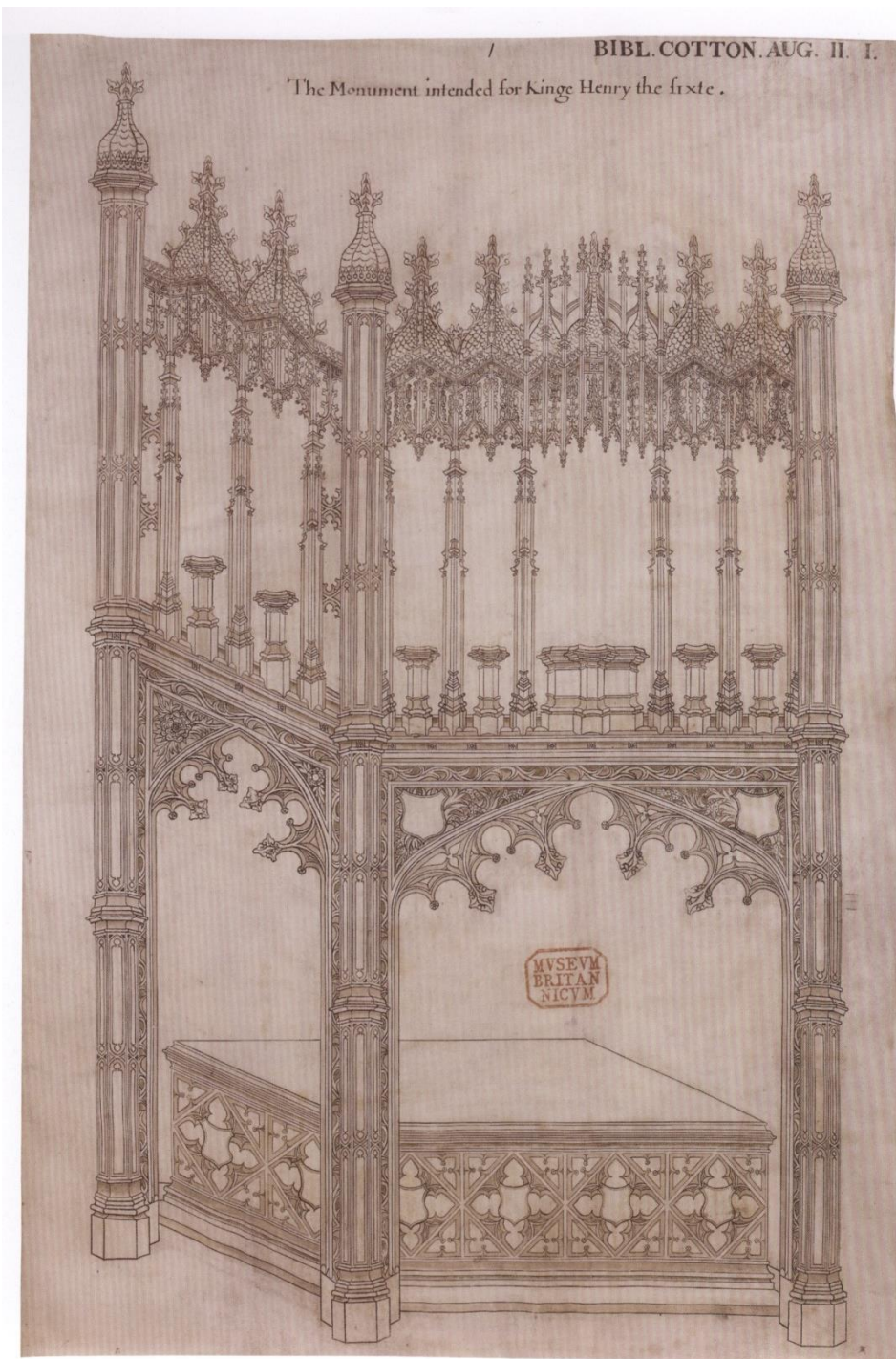


Fig. 44. A photograph of a drawing attributed to William Vertue. It is a proposal for a tomb for Henry VI, c. 1504-9. London, British Library, MS Cotton Augustus, II. i. Reproduced from: Gerbino and Johnston (2009), p.28.



Fig. 45. A coloured bird's eye view of "a Castle for the Downes" either Walmer or Sandown. (identical designs). London, British Library, MS Cotton Augustus I.i. f.21. Reproduced from: 'A Colored bird's Eye View of "A Castle for the Downes;" Probably an Early Design for Walmer and Sandown Castle', *British Library Online Gallery* <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/a/001cotaugi00001u00021000.htm>> [Accessed 3rd December, 2013].

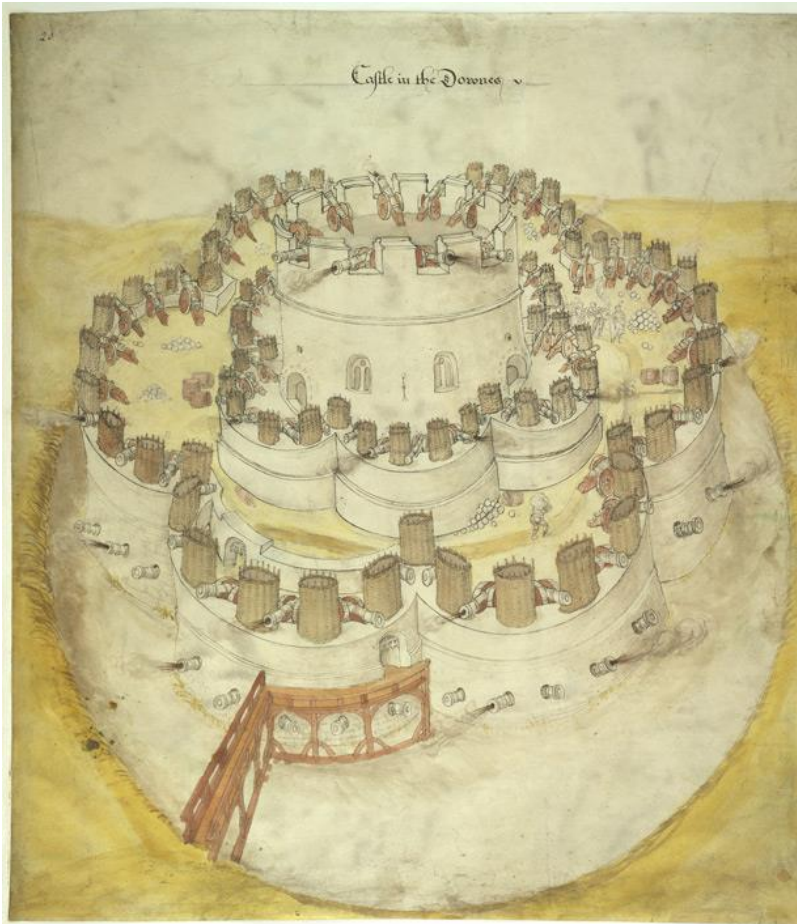


Fig. 46. A Coloured Bird's Eye View of a "Castle in the Downes," Probably an Early Design for Deal Castle. British Library, MS Cotton Augustus I.i. f.20. Reproduced from: 'A Coloured Bird's Eye View of a "Castle in the Downes," Probably an Early Design for Deal Castle', *British Library Online Gallery* <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/a/001cotaugi00001u00020000.html>> [Accessed 3rd December 2013].

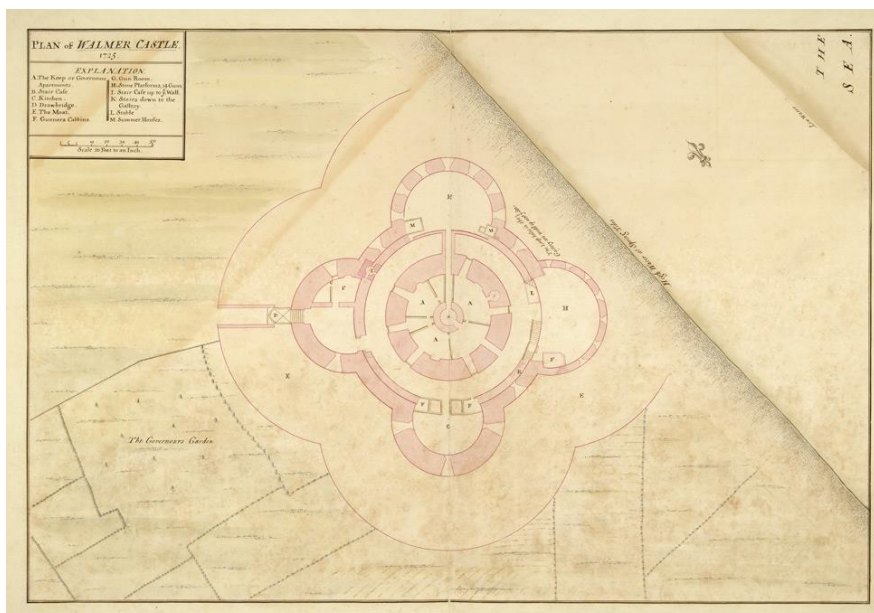


Fig. 47. A 1725 Drawing of Walmer castle, also portrayed in fig. 45. British Library, MS K Top. 18, no.59. Reproduced from: 'Plan of Walmer Castle', *British Library Online Gallery*,

<<http://www.bl.uk/onlinegallery/onlineex/kinggeorge/p/003ktop00000018u05900000.html>> [Accessed, 3rd December, 2013]



Fig. 48. A 1539 plan view of Deal castle, also portrayed in fig. 46. British Library, MS Cotton Augustus I.i. f.67. (52×52.5cm). Reproduced from 'Deal Castle, Kent', *British Library Online Gallery*, <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/d/001cotaugi00001u00067000.html>> [Accessed, 3rd December, 2013].

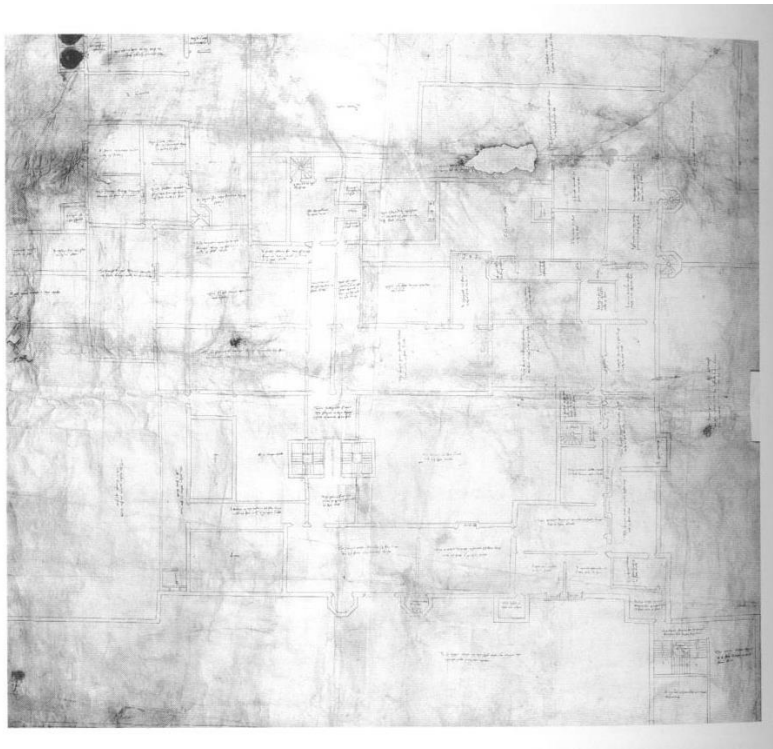


Fig. 49. Plan of the Exchequer. The original drawing is large and faint, which make photography difficult. A modern reproduction is provided below. British Library, MS Cotton Augustus I. Supp. 7. Reproduced from P.D.A Harvey *Maps in Tudor England* (London: British Library, 1993), p.96.

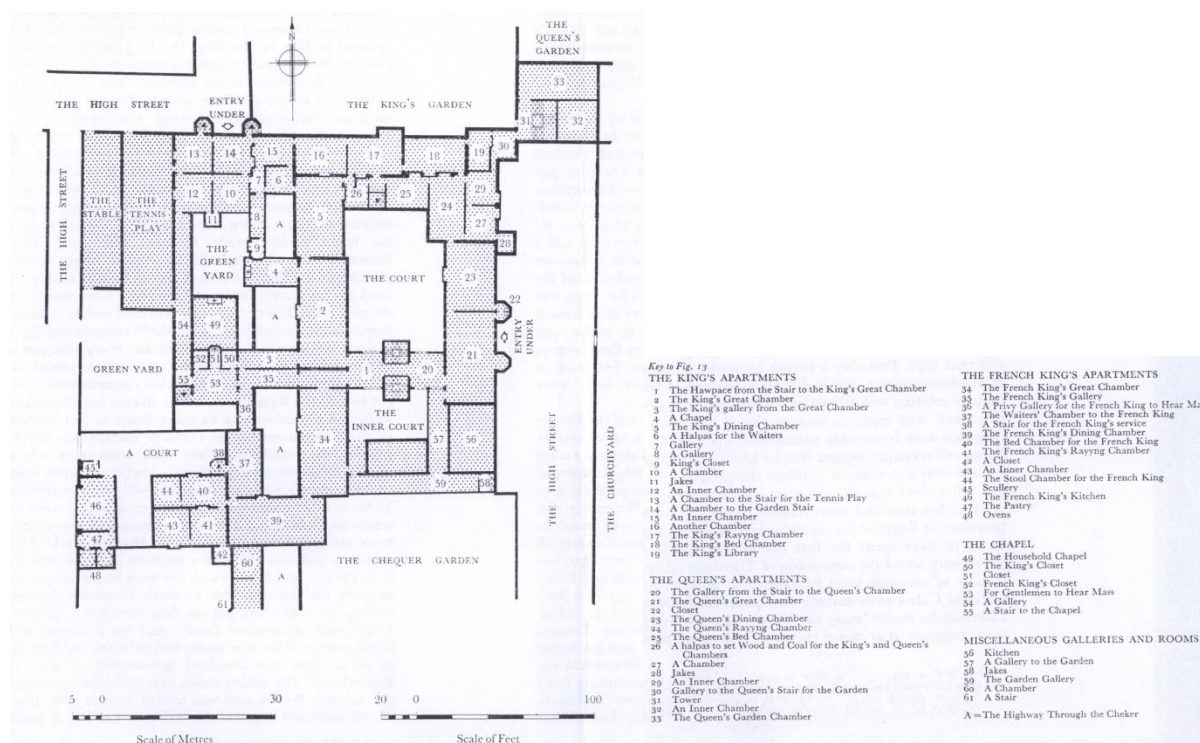


Fig 50a. Modern reproduction of Fig. 49. A plan of the exchequer at Calais arranged into three Royal suites. British Library, Cotton Augustus, I Supp. 7.

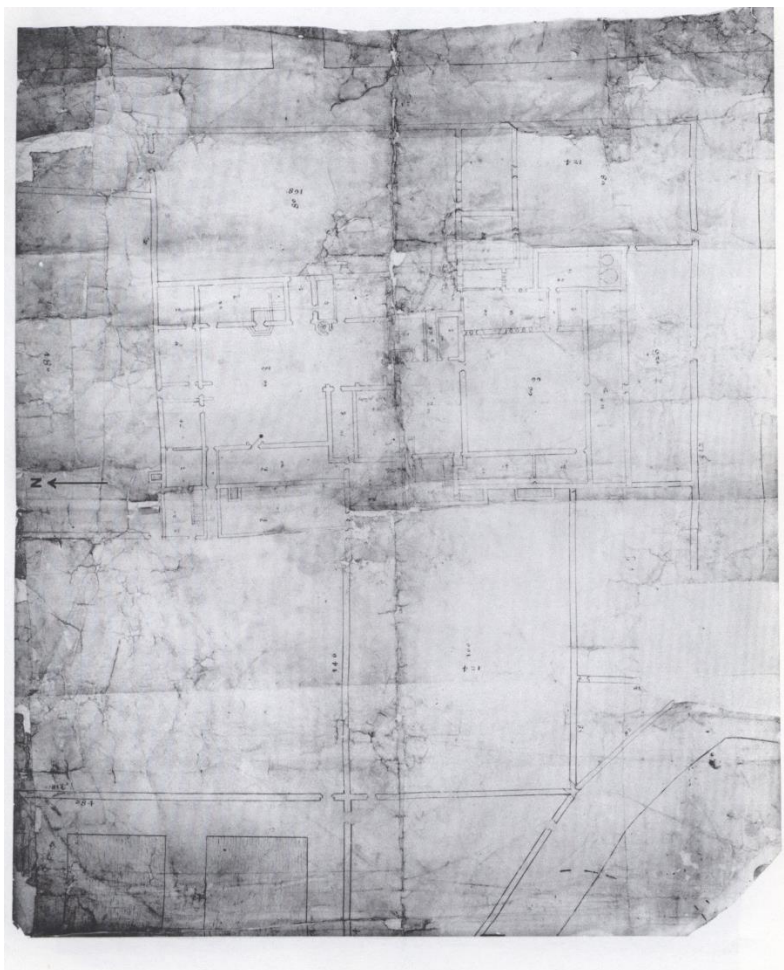


Fig 51a. Drawing of the ground floor of Hull Manor. British Library, MS Cotton Augustus I. Supp. I. (122×127.5cm). Reproduced from: Shelby (1967), Plate 10.

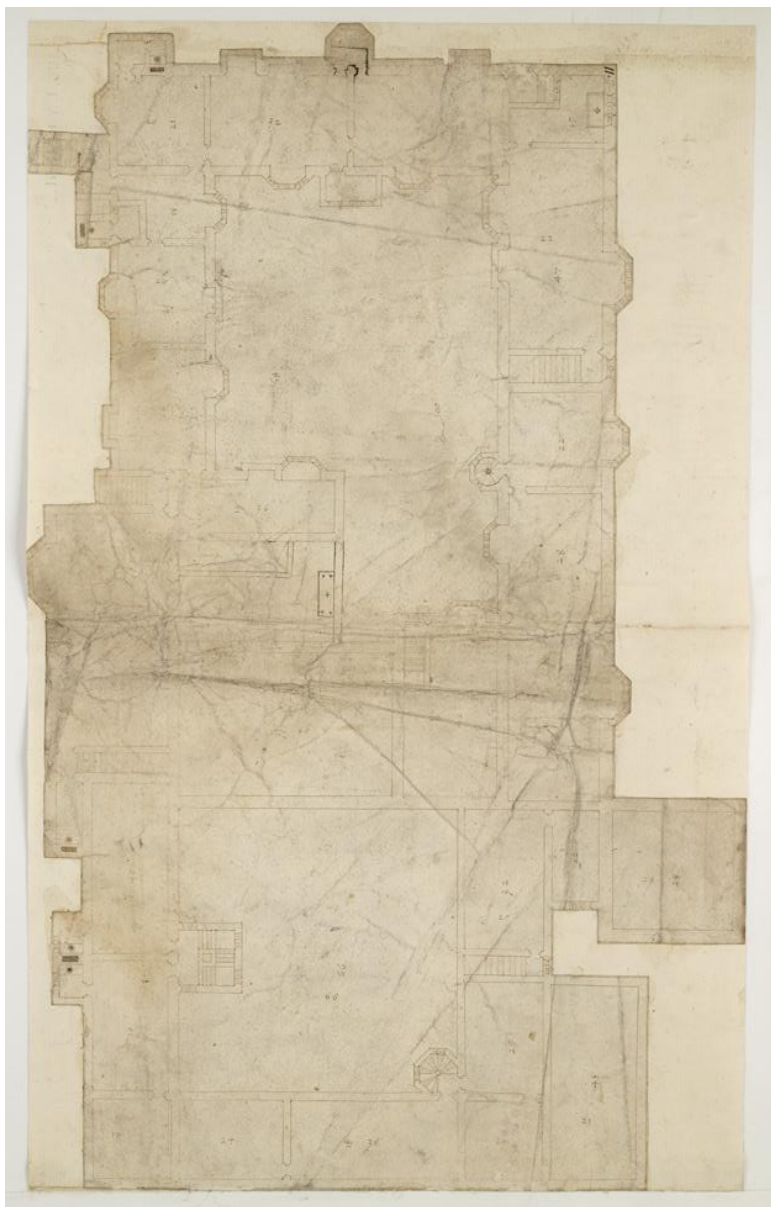


Fig. 51b. A drawing of the first floor of the King's manor house in Hull drawn by Rogers in 1541. British Library, MS Cotton Augustus I.ii. f.11. (41.5×26cm). Reproduced from: 'Hull Manor House f.11', *British Library Online Gallery* <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/h/001cotaugi00002u00011000.html>> [Accessed, 3rd December, 2013].

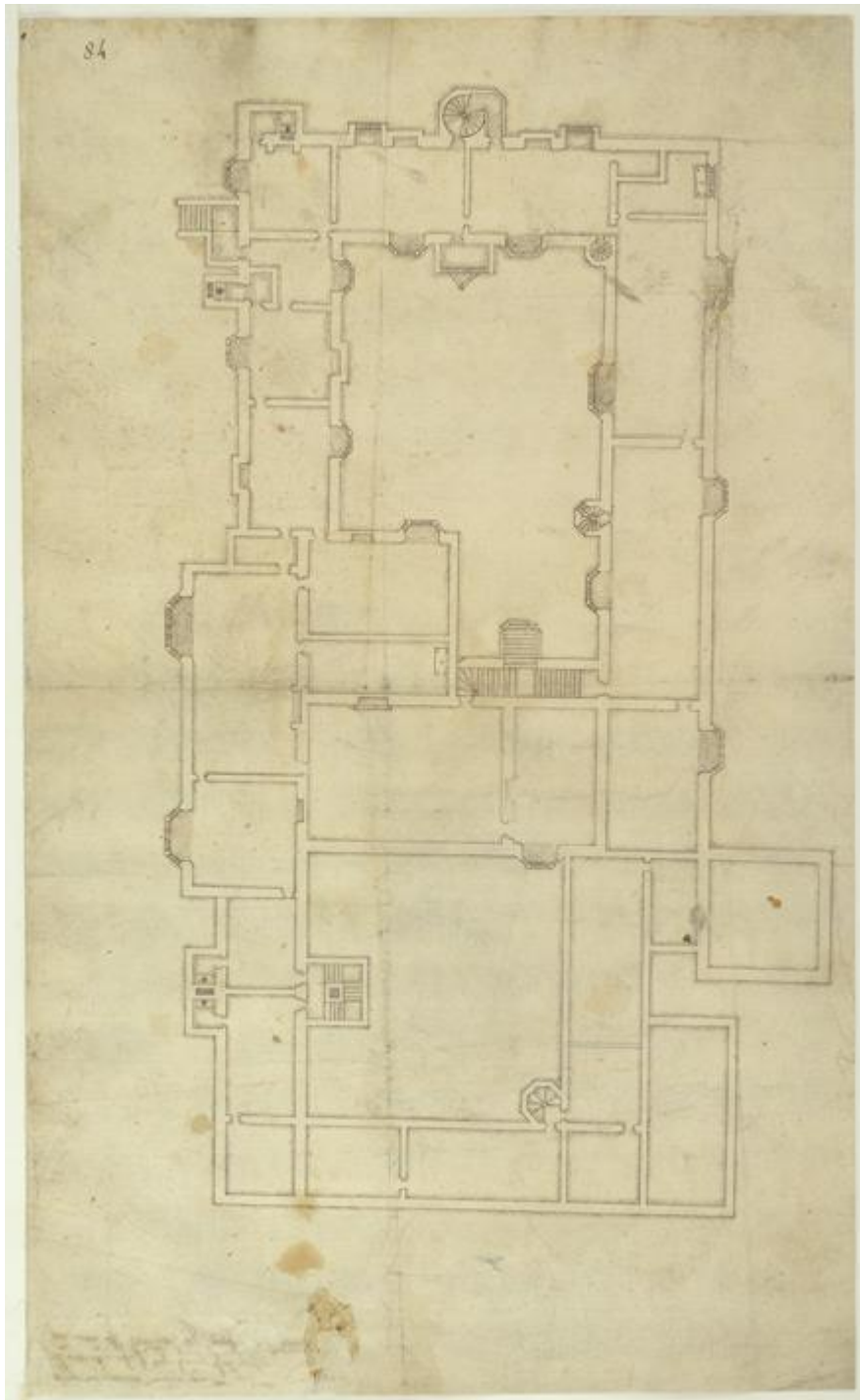


Fig. 51c. A drawing of the “new” plat made by Rogers of the first floor of Hull Manor house. British Library, MS Cotton Augustus, I.i. f.84. (76.5×78.3cm). Reproduced from: ‘A new plat made by Rogers, of the king his highnes mannor of Hulle’, *British Library Online Gallery* <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/a/001cotaugi00001u00084000.html>> [Accessed, 3rd December, 2013].



Fig. 52a. Drawing of the fortifications at Hull made by Rogers in 1541. British Library, MS Cotton Augustus I. Supp. 4. Reproduced in Gerbino and Johnson, (2009), p.37.



Fig. 52b. Detail of fig. 52a showing Roger's technical drawing of the fortification and his pictorial representation of the houses on the opposite river bank. British Library, MS Cotton Augustus I. Supp. 4. Reproduced from: Gerbino and Johnson, (2009), p.37.

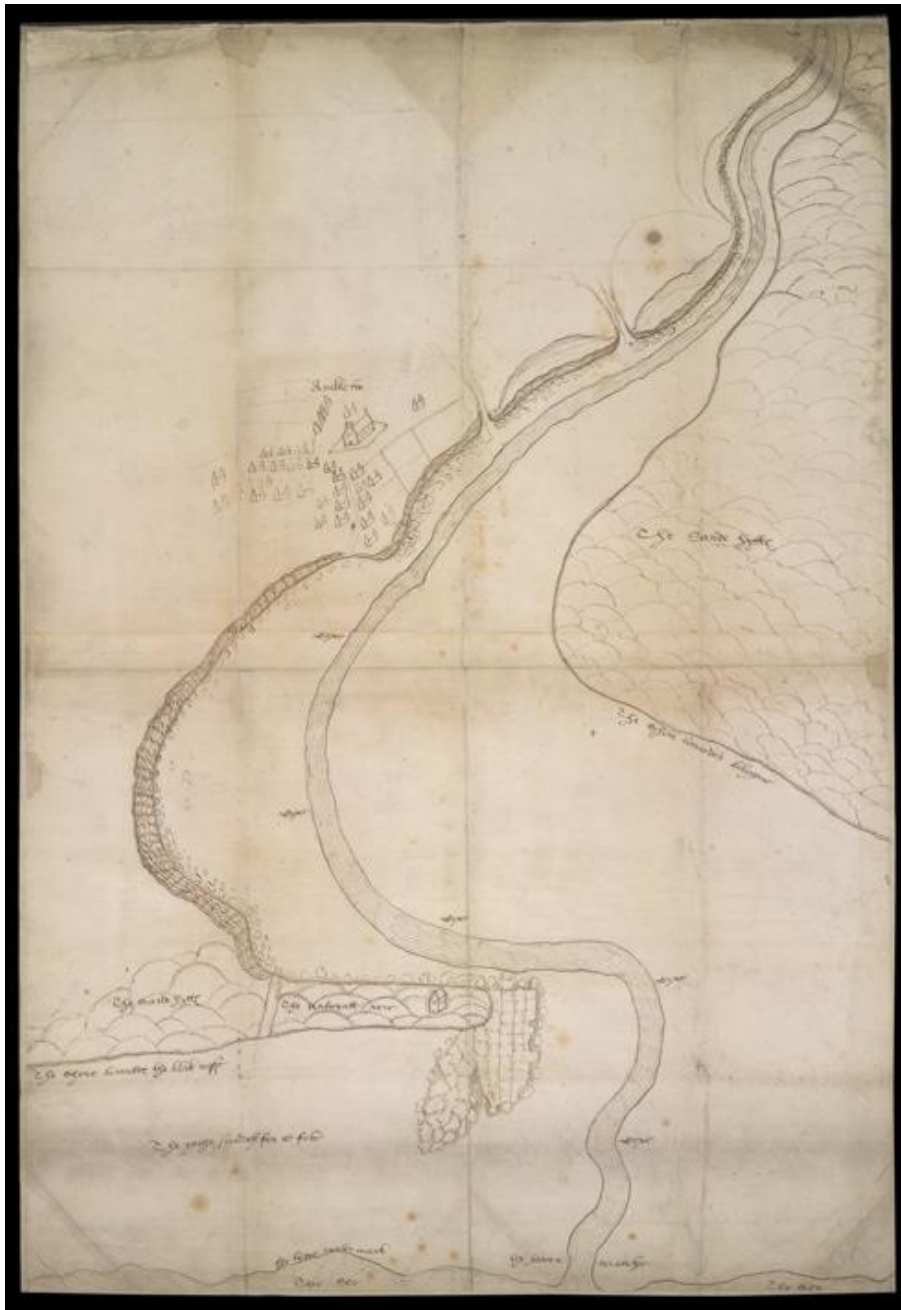


Fig. 53a. Drawing of the existing landscape and architectural features at Ambleteuse, probably made by Rogers's as a preliminary survey. The drawing has been subscribed with Rogers' initials and can act as an example of his work to compare to other images with less certain attributions, for example, fig. 54. British Library, MS Cotton Augustus I.i. f.59. Reproduced from: 'Ambleteuse Harbour [before fortification], France', *British Library Online Gallery* <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/a/001cotaugi00001u00059000.html>> [Accessed 3rd December, 2013].

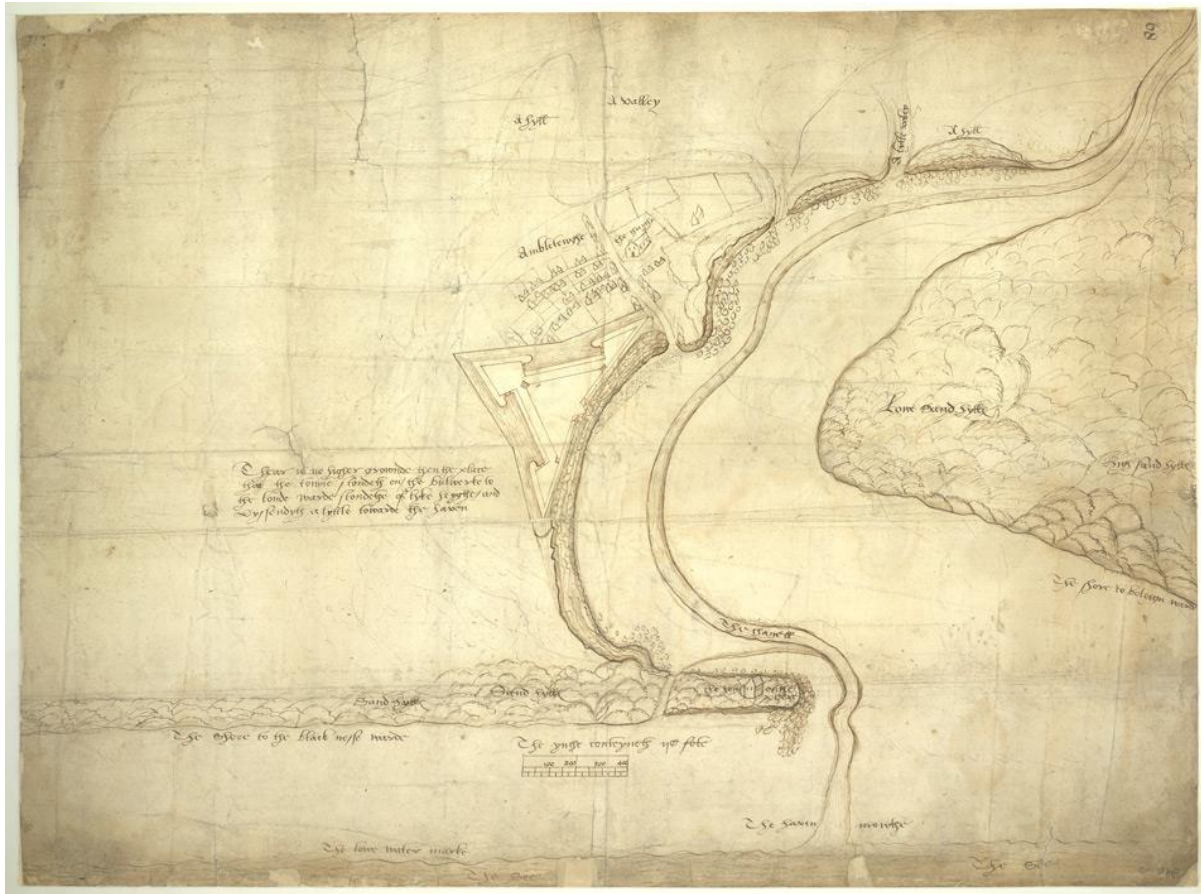


Fig. 53b. Drawing Of the proposed fortifications with four bulwarks made by Rogers and the commanders on site. British Library, MS Cotton Augustus I.ii. f.68. Reproduced from: 'A Plan of the Harbour of Ambletuse, shewing a project for a triangular fort [inserted at a later time?]; drawn by John Rogers [in 1546], "the ynche conteyneth ii c fote"', *British Library Online Gallery*, <<http://www.bl.uk/onlinegallery/onlineex/unvbrit/a/001cotaugi00002u00068000.html>> [Accessed 3rd December, 2013].

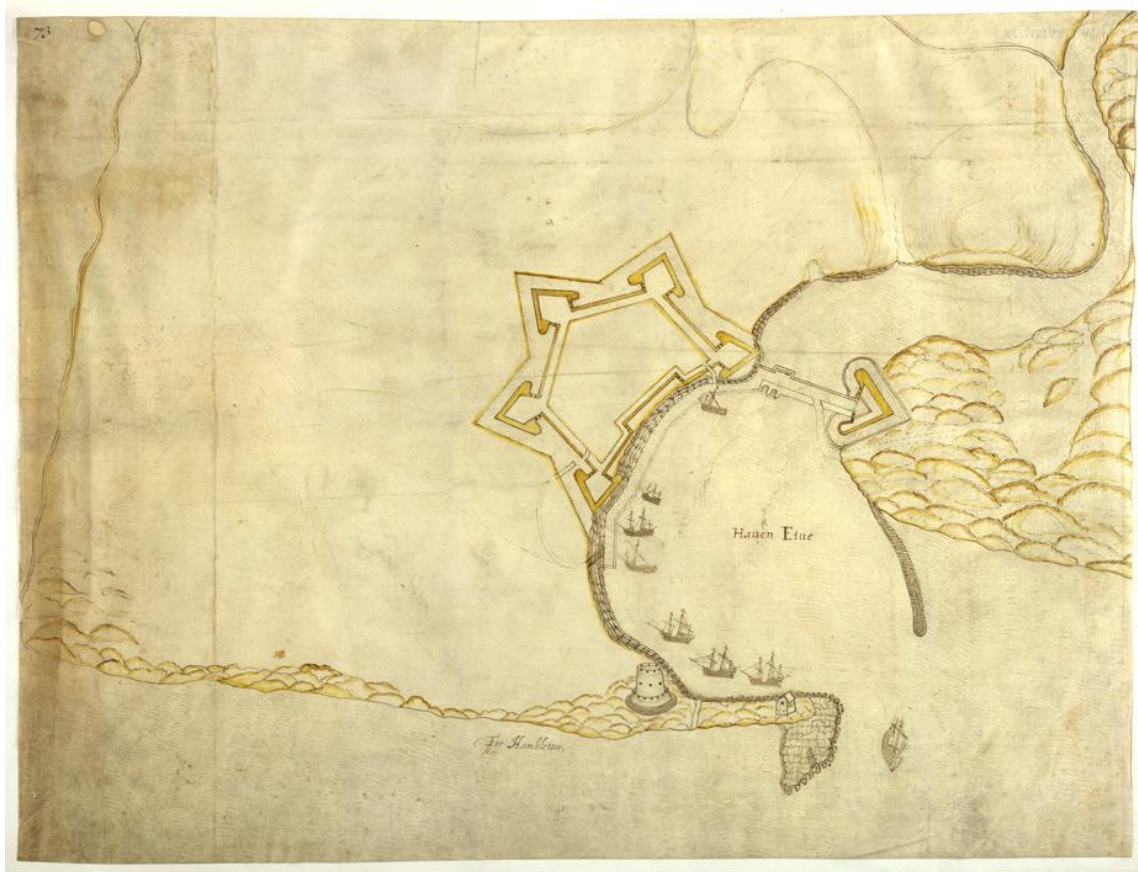


Fig. 53c. A drawing probably based on a initial survey of the landscape like fig. 53a. showing a fort with five bastions, this matches the description of the King's proposal for the works and Ambletuse and it is probable that this image was made in Whitehall following the King's instructions. British Library, MS Cotton Augustus I.ii. f.73. Reproduced from: 'Coloured Plan of the Fortifications of Haven Etue, Ambletuse, France', *British Library Online Gallery* < <http://www.bl.uk/onlinegallery/onlineex/unvbrit/c/001cotaugi00002u00073000.html> > [Accessed, 3rd December].



Fig. 54. Plan of the Boulonnais possible made as part of the negotiations around the treaty of camp and stylistically matching Roger's drawing of Ambleteuse. A red dotted line divides the image and may have been the projected boundary between the English and French territories. British Library, MS Cotton Augustus, I.ii. f.77. 'Boulogne and Its Environs, France', *British Library Online Gallery*, <http://www.bl.uk/onlinegallery/onlineex/unvbrit/b/001cotaugi00002u00077000.html> [Accessed 3rd December, 2013].

Bibliography

Maps.

- Cambridge, Magdalene College, Pepys Library, MS 1916 (Pepys's book of Medieval drawings)
- Cambridge, Corpus Christi College, Parker Library, MS 210 (William Worcestre's Itineraries)
- London, British Library, MS Cotton Augustus I.ii.49 (Plat of fortifications at Hull)
- British Library, MS Cotton Augustus I. Supp.3 (Plat of fortifications at Hull)
- British Library, MS Cotton Augustus I. Supp.4 (Plat of fortifications at Hull)
- British Library, MS Cotton Augustus I. Supp.14 (Plat of Guines)
- British Library, MS Cotton Augustus I.ii. f.51 (Plat of Guines)
- British Library, MS Cotton Augustus I. Supp.20 (Plat of the waterways around Hull)
- British Library, MS Cotton Augustus II. i (Plat attributed to William Vertue)
- British Library, MS Cotton Augustus I.i. f.21 (Plat of the fortification at Walmer or Sandown)
- British Library, MS Cotton Augustus I.i. f.20 (Plat of the fortification at Deal)
- British Library, MS K Top. 18, no.59 (Plat of the fortification at Deal)
- British Library, MS Cotton Augustus I.i. f.67 (Plat of the fortification at Deal)
- British Library, MS Cotton Augustus I. Supp.7 (Plat of the exchquer building at Calais)
- British Library, MS Cotton Augustus I. Supp.I (Plat of the manor house at Hull)
- British Library, MS Cotton Augustus I.ii. f.11 (Plat of the manor house at Hull)
- British Library, MS Cotton Augustus I.i. f.84 (Plat of the manor house at Hull)
- British Library, MS Cotton Augustus I.i. f.59 (Plat of the landscape of Ambleteuse)
- British Library, MS Cotton Augustus I.ii. f.68 (Plat of the fortification at Ambleteuse)
- British Library, MS Cotton Augustus I.ii. f.73 (Plat of the fortification at Ambleteuse)
- British Library, MS Cotton Augustus I.ii. f.77 (Plat of the Boulonnais)
- London, Royal Institute of British Architects, Smythson MS SA 51/2 (Drawing attributed to William Vertue)
- Royal Institute of British Architects, Smythson MS IV/2 (Drawing attributed to William Vertue)
- Worcestershire, Worcestershire record office, MS 716. 093 (Bishop Ghinucci's register)

Manuscript sources.

- London, British Library, Royal MS. 7. C. XVI.
- British Library, Royal MS. 7. C. XVI. f 81.
- London, The National Archives, MS SP 1/218
- The National Archives, MS E 101/173/7
- The National Archives, MS SP 68/13
- The National Archives, MS SP 1/167
- The National Archives, MS SP 1/ 193
- The National Archives, MS SP 1 / 195
- The National Archives, MS SP 1/ 216
- The National Archives, MS SP 1/218
- The National Archives, MS SP 1/218
- The National Archives, MS SP 1/129

Published Primary sources.

- The 1542 Inventory of Whitehall: the Palace and its Keeper*, ed. by Maria Hayward (London: Illuminata Publishers for the Society of Antiquaries of London, 2004)
- Aristotle, *The Complete Works of Aristotle: The Revised Oxford Translation*, ed. by Jonathon Barnes, (Princeton, N.J: Princeton University Press, 1995)
- Barham, G., *Masonry; an Elementary Textbook for Students in Trade Schools and Apprentices* (London: Longmans, 1914)
- Bevington, David, *Medieval Drama* (Boston: Houghton Mifflin, 1975)
- Carintha, Hermann of, *De Essentiis*, ed. and trans. by Charles Burnett (Leiden/Cologne, 1982)
- Frankl, Paul, *The Gothic: Literary Sources and Interpretations Through Three Centuries* (Princeton: Princeton University Press, 1960)
- Grantley, Darryll, *English Dramatic Interludes, 1300-1580: a Reference Guide* (Cambridge: Cambridge University Press, 2004)
- Hill, P.R., and David, J.C.E., *Practical Stone Masonry* (London: Donhead, 1995)
- Victor, Hugh St, *Hugh St Victor; Selected Spiritual Writings*, ed. by Penelope Lawson (London: Faber and Faber, 1962)
- The Inventory of King Henry VIII, Society of Antiquaries MS 129 and British Library MS Harley 1419*, ed. by David Starkey and Philip Ward (London: Harvey Miller Publishers for the Society of Antiquaries of London, 1998)
- Ives, Howard, *Stereotomy* (London: Chapman and Harley, 1930)
- Boyd-Thacher, John, *Christopher Columbus* (New York and London, 1903)
- Kish, George, *A Source Book in Geography* (Cambridge, Mass: Harvard University Press, 1978)
- The Late Medieval Religious Plays of Bodleian MSS Digby 133 and e Museo 160*, ed. by Donald Baker, John Murphy and Louis Hall (Oxford: Oxford University Press, 1982)
- Letters and Papers, Foreign and Domestic of the Reign of Henry VIII: Preserved in the Public Record Office, the British Museum, and elsewhere in England*, 22 vols., ed. by J. Brewer and R. Brodie (London: Longman, Green, Longman, & Roberts, 1862-1932)
- The Macro Plays: The Castle of Perseverance, Wisdom, Mankind*, ed. by Mark Eccles (Oxford: Oxford University Press, 1969)
- Medwall, Henry, *The Plays of Henry Medwall: a Critical Edition* (New York: Garland Publishers, 1981)
- A New and Fresh Translation of the Letters of Christopher Columbus*, trans. by Samuel Morrison (Madrid: Graficas Yagues, 1959)
- Ptolemy, Claudius, *The Almagest*, ed. by R. Talliaferro and Charles Wallis (Chicago: London: Encyclopaedia Britannica, 1990)
- *Ptolemy's Geography: An Annotated Translation of the Theoretical Chapters*, ed. by J. Lennart Berggren and Alexander Jones (Princeton, N.J.: Princeton University Press, 2000)
- Rastell, John, *Three Rastell Plays: Four Elements, Calisto and Melebea, Gentleness and Nobility*, ed. by Richard Axton (Cambridge: D.S. Brewer, 1979)
- Reed, A.W., *Early Tudor Drama: Medwall, the Rastells, Heywood, and the More circle* (London: Metheun, 1926)

- Reisch, Gregor, *Natural Philosophy Epitomised: Books 8-11 of Gregor Reisch's Philosophical Pearl[Margarita Philosophica]*, ed. by Andrew Cunningham and Kusukawa Sachiko (Farnham: Ashgate, 2010)
- Roberts, R.J., 'John Rastell's inventory of 1538', *The Library*, 6th Series 1 (1979), pp.34-42
- Roriczer, Mathes, and Hanns Schmuttermayer, *Gothic Design Techniques: The Fifteenth-Century Design Booklets of Mathes Roriczer and Hanns Schmuttermayer*, ed. by Lon Shelby (Carbondale: Southern Illinois University Press, 1977)
- Sacrobosco, John of, *The Sphere of Sacrobosco and its Commentators*, ed. by Lynn Thorndike (Chicago: University of Chicago Press, 1949)
- Salzman, L.F., 'Appendix A' and 'Appendix B', in *Building in England Down to 1540, a Documentary History* (Oxford: Clarendon, 1952), pp.355-412 and 413-584
- The Two Earliest Masonic Manuscripts*, ed. by Douglas Knoop and G.P. Jones (Manchester: Manchester University Press, 1938)
- Warland, Edmund, *Modern Practical Masonry* (London: Pitman, 1953)
- Worcestre, William, *Itineraries Edited from the Unique Corpus Christi MS 210*, ed. J.H. Harvey (Oxford: Clarendon, 1969)

Secondary Sources.

- Ackerman, James, 'Science and Visual Art', in *Seventeenth Century Science and the Arts*, ed. by Hedly Rhys (Princeton: Princeton University Press, 1961), pp.63-90
- *Distance Points: Essays in Theory and Renaissance Art and Architecture* (Cambridge, MA.: M.I.T Press, 1991)
- 'The Origins of Architectural Drawing in the Middle Ages and the Renaissance', in *Origins, Imitation and Conventions Representation in the Visual Arts* (Cambridge, Mass.: MIT Press, 2002), pp.27-66
- Aers, David, 'Reflections on Current Histories of the Subject', *Literature and History, Second Series, Part ii* (1991), pp.20-34
- 'A Whisper in the Ear of the Early Modernists or Reflections on Literary Critics Writing the 'History of the Subject'', in *Culture and History 1350-1600*, ed. by David Aers (New York: Harvester Wheatsheaf, 1992), pp.177-202
- 'Altars of Power: Reflections on Eamon Duffy's *The Stripping of the Altars*', *Literature and History*, 3rd Series (1994), pp.90-105
- Alexander, Jennifer, 'Masons Marks and Stone Bonding', in *The Archaeology of Cathedrals*, ed. by T. Tatton Brown and Julian Munby (Oxford: Oxford University Committee for Archaeology, 1996), pp.219-236
- 'Southwell Minster Choir: the Evidence of Masons Marks', in *Southwell and Nottinghamshire: Medieval Art, Architecture and Industry*, ed. by Jennifer Alexander (Leeds: British Archaeological Association, 1998), pp.44-59
- Allen, Gary, *Applied Spatial Cognition, from Research to Cognitive Technology* (London: Lawrence Erlbaum Associates, 2001)
- Andrews, J.H., 'Introduction; Meaning Knowledge, and Power in the Map Philosophy of J.B. Harley', in *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), pp.2-32
- Andrews, Michael Corbet, 'The British Isles in the Nautical Charts of the xivth and xvth Centuries', *Geographical Journal*, 68 (1926), pp.474-81

- Anglo, Sydney, 'William Cornish in a Play, Pageants Prisons and Politics', *Review of English Studies*, n.s.10 (1959), pp.347-60
- 'The London Pageant for the Reception of Katherine of Aragon: November 1501', *Journal of the Warburg and Courtauld Institutes*, XXVI (1963), pp.53-89
- 'Henry VIII and the Origins of Tudor Patronage', in *Patronage in the Renaissance*, ed. Guy Lytle and Stephen Orgel (Cambridge, Mass.: Princeton University Press, 1981), pp.117-164
- 'The Evolution of the early Tudor Disguising, Pageant and Mask', in *Renaissance Drama, New Series*, i (1986), pp.3-44
- 'Triumphal Drama: Form in English Civil Pageantry', in *Renaissance Drama as Cultural History*, ed. by Mary Rose (Evanston: Northwestern University Press, 1990), pp.36-56
- *Images of Tudor Kingship* (London: Seaby, 1992)
- *Spectacle, Pageantry, and Early Tudor Policy*, 2nd edn. (Oxford: Oxford University Press, 1997)
- "'He that saw it would not believe it', Anne Boleyn's Royal entry into London", in *Civic Ritual and Drama*, ed. Alexandra Johnson and Wim Husken (Amsterdam: Rodolphi Press, 1997), pp.39-80
- Axton, Marie, 'The Tudor Mask and Elizabethan Court drama', in *English Drama: Forms and Developments*, ed. by Marie Axton and Muriel Williams (Cambridge: Cambridge University Press, 1977), pp.24-47
- Barber, Peter, 'England I: Pageantry, Defense and Government: Maps at Court to 1550', in *Monarchs, Ministers and Maps*, ed. by David Buisseret (Chicago: Newberry Library, 1985), pp.26-57
- 'Map Making in England ca.1470-1650', in *The History of Cartography: Cartography in the European Renaissance, Vol. 3, Part 2*, ed. by David Woodward (Chicago: University of Chicago Press, 2007), pp.1589-1669
- Barthes, Roland, 'The Discourse of History', in *Comparative Criticism: A Year Book. Vol.3*, ed. by E.S. Schaffer (Cambridge: Cambridge University Press, 1981), pp.3-20
- 'Introduction to the Structural Analysis of Language', in *Image Music Text*, trans. by Stephen Heath (London: Flamingo, 1988), pp.79-124
- Baumann, Uwe, *Henry VIII in History, Historiography and Literature* (Frankfurt am Main: Lang, 1993)
- Baxandall, Michael, *Giotto and the Orators: Humanist Observers of Painting in Italy and the Discovery of Pictorial Composition, 1350-1450* (Oxford: Clarendon Press, 1971)
- *The Limewood Sculptors of Renaissance Germany* (Yale: Yale University Press, 1980)
- *Painting and Experience in Fifteenth Century Italy: a Primer in the Social History of Pictorial Style* (Oxford: Oxford University Press, 1988)
- Belsey, Catherine, 'The Stage Plan of the Castle of Perseverance', *Theatre Notebook*, 28: 3 (1974), pp.124-32
- Bernard, J. E., *The Prosody of the Tudor Interlude* (Oxford: Oxford University Press, 1939)
- Bevington, David, *From Mankind to Marlowe: The Growth of Structure in the Popular Drama of Tudor England* (Harvard: Harvard University Press, 1962)
- "'Man think on Thine Endinge Day": Stage Pictures of Just Judgement in *The Castle of Perseverance*', in *Homo Memento Finis: The Iconography of Just Judgement in Medieval Art and Drama*, ed. by David Bevington (Kalamazoo: Medieval Institute Publications, 1985), pp.147-77

- Binding, Gunther, *Medieval Building Techniques*, trans. by Alex Cameron (Stroud: Tempus, 2004)
- Bindle, Martin, 'A Thirteenth Century Sketch from the Hospital of St John the Evangelist, Cambridge', *Proceedings of the Cambridge Antiquarian Society*, 44 (1961), pp.99-108
- Bloomfield, Morton, *The Seven Deadly Sins* (Michigan: Michigan State University Press, 1967)
- Blum, Pamela, 'The Sculptures of the Salisbury Chapter House', in *Salisbury Cathedral Medieval Art and Architecture*, ed. by Laurence Keen and Thomas Cocke (Tring: British Archeological Association Conference Transactions 17, 1996), pp.68-78
- Bony, Jean, 'The Stonework Planning of the first Durham Master', in *The Engineering of Medieval Cathedrals*, ed. by Lynn Courteney (Aldershot: Ashgate Variorum, 1997), pp.19-34
- Borish, M.E., 'Sources and Intentions of *The Four Elements*', *Studies in Philology*, 35: 2 (1938), pp.149-63
- Branner, Robert, 'Drawings from a Thirteenth Century Architects Shop', *Journal of the Society of Architectural Historians*, XVII (1958), pp.9-22
- 'Villard de Honnecourt, Archimedes and Chartres', *Journal of the Society of Architectural Historians*, XIX (1960), pp.91-6
- 'Villard de Honnecourt, Reims and the Origin of Gothic Drawing', *Gazette de Beaux Arts* (March, 1963), pp.129-46
- 'Design in Gothic Architecture', *Journal of the Society of Architectural Historians*, XVII (1968), pp.49-71
- *Architector; The Lodge Books and Sketch Books of Medieval Architects* (New York: Araris Books, 1979)
- Bricker, C., and R. V. Tooley, *Landmarks of Mapmaking: An Illustrated Survey of Maps and Mapmakers* (Brussels: Elsevier-Sequoia, 1968)
- Brietenberg, Mark, "'The hole matter opened' iconic representation and interpretation in 'The Quenes majesties Passage'", *Criticism*, 28 (1986), pp.1-25
- Brotton, Jerry, *Trading Territories: Mapping the Early Modern World* (London: Reaktion, 1997)
- *A History of the World in Twelve Maps* (London: Allen Lane, 2012)
- 'Tragedy and Geography', in *A Companion to Shakespeare's Works*, ed. by Richard Dutton and Jean E. Howard (Maldon: Blackwell, 2003), pp.219-241
- Brown, Sarah, 'Our Magnificent Fabrick' *York Minster: An Architectural History. C.1220 - 1500* (Swindon: English Heritage, 2003)
- Bruster, Douglas, 'The Dramatic Lives of Objects in Early Modern Theatre', in *Stages Properties in Early Modern English Drama*, ed. by Jonathan Harris and Natasha Korda (Cambridge: Cambridge University Press, 2002), pp.67-96
- Bucher, Frank, 'Medieval architectural Design Methods 800-1560', *Gesta*, Vol. 11, No. 2 (1972), pp.37-51
- Burgin, Victor, *In/different spaces: Place and Memory in Visual Culture* (Berkeley: California University Press, 1996)
- Burke, Kenneth, *Language as Symbolic Action: Essays on Life, Literature, and Method* (Berkeley: University of California Press, 1966)
- Camden, R.W., 'The Italian Artists in England During the Sixteenth Century', in *Proceedings of the Society of Antiquaries*, 2nd ser. xxiv (1911-12), pp.171-204

- Campbell, Tony, 'Portolan Charts from the Late Thirteenth Century to 1500', in *The History of Cartography: Cartography in Prehistoric, Ancient and Medieval Europe and the Mediterranean Part 3, Vol. 1*, (Chicago: University of Chicago Press, 1987), pp.371-463
- Carnival and the Carnavalesque: the Fool, the Reformer, the Wildman and Others in early Modern Theatre*, ed. by Konrad Eisenbichler and Wim Hasken (Amsterdam: Rodopi Press, 1999)
- Carpenter, David, 'Westminster Abbey: some Characteristics of its Sculpture. The Workshop of the Censing Angels in the South Transept', *Journal of the British Archaeological Association*, 35 (1972), pp.1-14
- Carpenter, Sarah, 'The Sixteenth Century Court Audience: Spectators or Performers?', *Medieval English Theatre*, 19 (1997), pp.3-14
- Cartwright, Kent, *Theatre and Humanism. English Drama in the Sixteenth Century* (Cambridge: Cambridge University Press, 1999)
- Casey, Edward, *Getting Back into Place: Toward a Renewed Understanding of the Place World* (Bloomington: Indiana UP, 1993)
- *The Fate of Place : A Philosophical History* (Berkeley: University of California Press, 1994)
- Cave, Terrence, *The Cornucopian Text, Problems of Writing in the French Renaissance* (Oxford: Clarendon, 1979)
- Charles, F.D.B., 'A Sixteenth Century Drawing of a Timber Framed Town House', *Transaction of the Worcester Architectural Society*, 3rd Series, iii (1970-2), pp.67-69
- Chatillion, Jean, 'Hugh of St. Victor', in *Complete Dictionary of Scientific Biography* (2008) <http://www.encyclopedia.com/topic/Hugh_of_Saint_Victor.aspx> [accessed 4 July 2013]
- Clark, Stewart, *Thinking with Demons, The Idea of Witchcraft in Early Modern Europe* (Oxford: Oxford University Press, 1997)
- Cocke, Thomas and Paul Kidson, *Salisbury Cathedral; Perspectives on Architectural history*. (London: H.M.S.O, 1993)
- Colchester, L.S., and J.H. Harvey, 'Wells Cathedral[...] Appendix: The Wells Tracing Floor', *Archeological Journal*, 131 (1974), pp.200-214
- Colchester, L.S., *Wells Cathedral* (London: Unwin Hyman, 1987)
- Coldstream, Nicola, *Masons and Sculptors* (London: British Museum Press, 1991)
- *Medieval Architecture* (Oxford: Oxford University Press, 2002)
- Colish, Marcia, *The Mirror of Language: a Study in the Medieval Theory of Knowledge* (Lincoln: University of Nebraska Press, 1983)
- Colletti, Theresa, *Mary Magdalene and the Drama of the Saints; Theatre Gender and Religion in Late Medieval England* (Pennsylvania: University of Pennsylvania, 2004)
- Colvin, H.M., *The Building Accounts of Henry III* (Oxford: Oxford University Press, 1974)
- *The History of the King's Works Vol. I; The Middle Ages*, ed. by H.M. Colvin (HMSO: London, 1963)
- *The History of the King's Works Vol. III; 1485- 1660 Part I*, ed. by H.M. Colvin (HMSO : London, 1975)
- *The History of the King's Works Vol. IV; 1485- 1660 Part II*, ed. by H.M. Colvin (HMSO: London, 1982)
- 'Recycling the Monasteries; Demolition and Reuse by the Tudor Government', in *Essays in English Architectural History*, ed. by H. Colvin (New Haven, Ct.: Yale University Press, 1999), pp.45-67

- Conley, Tom, *The Self-Made Map: Cartographic Writing in Early Modern France* (Minneapolis: University of Minnesota Press, 1996)
- Coope, Rosalys, '“The long gallery”: Its Origins, Development, Use and Decoration', *Architectural History*, 29 (1986), pp.43-72
- Cooper, J.P., 'A Revolution in Tudor History?', *Past & Present*, (1963), pp.110-12
- Cortesao, Armando, *The Nautical Chart of 1424 and the Early Discovery and Cartographical Representation of America: A Study on the History of Early Navigation and Cartography* (Coimbra: University of Coimbra, 1954)
- Cosgrove, Denis, 'Introduction: Iconography and Landscape', in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*, ed. by Denis Cosgrove and Stephen Daniels (Cambridge, Cambridge University Press, 1988), pp.1-10
- *The Palladian Landscape: Geographical Change and its Cultural Representations in Sixteenth-Century Italy* (Leicester: Leicester University Press, 1993)
- 'Images of Renaissance Cosmography, 1450-1650', in *The History of Cartography: Cartography in the European Renaissance, Part 1, Vol. 3* (Chicago: University of Chicago Press, 2007), pp.55-98
- Coulton, G.G., *Art and the Reformation* (Oxford: Basil Blackwell, 1928)
- Cox, John, *The Devil and the Sacred in English Drama 1330-1642* (Cambridge: Cambridge University Press, 2000)
- Crary, Jonathon, 'Modernising Vision', in *Vision and Visuality*, ed. by Hal Foster (Seattle: Washington Bay, 1988), pp.29-49
- *Techniques of the Observer* (Cambridge, Mass.: MIT Press, 1990)
- Crone, Gerald, *Maps and Their Makers: An Introduction to the History of Cartography*, (London: Hutchinson University Library, 1953)
- Crook, John, 'New Light on the History of St Mary's Church, Old Basing, Hampshire: an Incised Design', *Journal of the British Archaeological Association*, 154 (2004), pp.92-132
- Curry, Michael, *The Work in the World: Geographical Practice and the Written Word* (Minneapolis: University of Minnesota Press, 1996)
- Daston, Lorraine, 'The Nature of Nature in Early Modern Europe', *Configurations*, 6 (1998), pp.149-72
- Davis, Nicholas, 'The Meaning of the Word “Interlude” a Discussion', *Medieval English Theatre*, 6 (1984), pp.5-27
- De Certeau, Michel, *The Practice of Everyday Life*, trans. by Stephen Randall (California: University of California Press, 1988)
- *The Writing of History*, trans. by Tom Conley (New York: University of Columbia Press, 1988)
- De la Croix, Horst, 'The Literature on Fortification in Renaissance Italy', *Technology and Culture*, 4 (Winter, 1963), pp.30-50
- De Rotz, Jean, *The Map and Text of the Booke of Idrography presented by Jean de Rotz to Henry VIII*, ed. by Helen Wallis (Oxford: British Library, 1981)
- Delano-Smith, Catherine, and Roger Kain, *English Maps: A History* (London: British Library, 1999)
- Devereux, E.J., 'John Rastell's Utopian Voyage', *Moreana*, 13:51 (1976), pp.119-23
- Dillon, Janette, 'John Rastell's Stage', *Medieval English Theatre*, 18 (1996), pp.15-40
- 'John Rastell vs Henry Walton', *Leeds Studies in English*, 28 (1997), pp.57-75

- *Language and the Stage in Medieval and Renaissance England* (Cambridge: Cambridge University Press, 1998)
- *Performance and Spectacle in Hall's Chronicle* (London: Society for Theatre research, 2002)
- 'Chariots and Cloud machines: Gods and Goddesses on Early English Stages', in *Tudor Drama Before Shakespeare 1485-1590*, ed. by Lloyd Kermode, Jason Scott-Warren and Martine Van Elk (Basingstoke: Palgrave, 2004), p.111-129
- *The Language of Space* (Cambridge: Cambridge University Press, 2010)
- Djwa, S., 'Early Explorations: New Founde Landys (1429-1729)', *Studies in Canadian Literature* (1979), pp.7-21
- Dronke, Peter, *The Medieval Lyric* (London: Hutchinson, 1968)
- Duffy, Christopher, *Siege Warfare: the Fortress in the Early Modern World* (London: Routledge and Kegan Paul, 1979)
- Duffy, Eamon, *The Stripping of the Altars, Traditional Religion in England, 1400-1580* (New Haven: Yale University Press, 1992)
- Edney, Mathew, 'Cartography without 'Progress:' Reinterpreting the Nature and Historical Development of Map Making', in *Classics in Cartography: Reflections on Influential Articles from Cartographica*, ed. by Martin Dodge (Chichester, UK: J. Wiley & Sons, 2011.), pp.305-329
- 'Reflections Essay: Progress and the Nature of Cartography' in *Classics in Cartography: Reflections on Influential Articles from Cartographica*, ed. by Martin Dodge (Chichester, UK: J. Wiley & Sons, 2011), pp.331-342
- Edson, Evelyn, *Mapping Time and Space: How Medieval Mapmakers Viewed their World* (London: British Library, 1999)
- Edwards, Jess, *Writing, Geometry and Space in Seventeenth-Century England and America: Circles in the Sand* (London: Routledge, 2006)
- Elton, Geoffrey, *The Tudor Revolution in Government: Administrative Changes in the Reign of Henry VIII* (Cambridge: Cambridge University Press, 1953)
- 'The Tudor Revolution: a Reply', *Past & Present*, 29 (1964), pp.26-49
- 'A Revolution in Tudor History?', *Past & Present*, 32 (1965), pp.103-9
- *Policy and Police: the Enforcement of the Reformation in the Age of Cromwell* (Cambridge: Cambridge University Press, 1972)
- Emmerson, R. K., 'The Morality Character as Sign: A Semiotic Approach to the Castle of Perseverance', *Mediaevalia*, 18 (1995 for 1992), pp.191-220
- Evetts, David, *Literature and the Visual Arts in Tudor England* (Georgia: University of Georgia Press, 1990)
- Fernie, Eric, 'The Groundplan of Norwich and the Square Root of Two', in *The Engineering of Medieval Cathedrals*, ed. by Lynn Courteney (Aldershot: Ashgate Variorum, 1997)
- 'Introduction', in *Ad Quadratum: The Practical Application of Geometry in Medieval Architecture*, ed. by Nancy Wu (Aldershot: Ashgate, 2002), pp.1-9
- Findlen, Paula, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994)
- Fiorani, Francesca, *The Marvel of Maps: Art, Cartography and Politics in Renaissance Italy* (New Haven, Conn.: Yale University Press, 2005)
- Forstater, A., and J.L. Baird, "'Walking and Wending": Mankind's opening speech', *Theatre Notebook*, 26: 1 (1971-2), pp.60-4

- Frank, Lestringant, 'The Crisis in Cosmography at the End of the Renaissance', in *Humanism in Crisis: The Decline of the French Renaissance*, ed. by Philippe Desan (Ann Arbor: University of Michigan Press, 1999), pp.153-179
- Gautier-Dalché, Patrick, 'The Reception of Ptolemy's Geography (End of the Fourteenth to Beginning of the Sixteenth Century)', in *The History of Cartography: Cartography in the European Renaissance, Part 1, Vol. 3* ed. by David Woodward (Chicago: The University of Chicago Press, 2007), pp.285-364
- Genette, Gerard, *The Architext, an Introduction*, trans. by Jane Lewin (Berkley: University of California press, 1992)
- *Paratexts: Thresholds of Interpretation*, trans. by Jane Lewin (Cambridge: Cambridge University Press, 1997)
- Gerbino, Anthony and Stephen Johnston, *Compass and Rule; Architecture as Mathematical Practice 1500-1750* (New Haven, Conn.: Yale University Press, 2009)
- Gilchrist, Roberta, *Norwich Cathedral Close; the Evolution of the English Cathedral Landscape* (Woodbridge: Boydell, 2005)
- Girouard, Mark, 'Three Gothic Drawings in the Smithson Collection', *Journal of the R.I.B.A.*, 3rd Ser., LXIV, No. 1 (1956), pp.359-365
- 'The Smythson Collection in the RIBA', *Architectural History*, 5 (1962), pp.123-183
- Givens, Jean, 'The Leaves of Southwell Re-visited', in *Southwell and Nottinghamshire: Medieval Art, Architecture and Industry* (Leeds: British Archaeological Association, 1998), pp.44-59
- Grant, Edward, *Planets, Stars, and Orbs: The Medieval Cosmos, 1200-1687* (Cambridge: Cambridge University Press, 1994)
- 'Medieval Natural Philosophy: Empiricism without Observation', in *The Dynamics of Aristotelian Natural Philosophy from Antiquity to the Seventeenth Century*, ed. by Cees Leijenhorst (Leiden: Brill, 2002), pp.141-168
- *The Nature of Natural Philosophy in the Late Middle Ages* (Washington D.C.: Catholic University of America Press, 2010)
- Greene, Thomas, *The Light in Troy: Imitation and Discovery in Renaissance Poetry* (New Haven, Conn.: Yale University Press, 1971)
- *The Descent from Heaven; A Study in Epic Continuity* (New Haven, Conn.: Yale University Press, 1982)
- Grossinger, Christa, *The World Upside Down: English Misericords* (London: Harvey Miller, 1997)
- Grosz, Elizabeth, *Space, Time and Perversion; Essays on the Politics of Bodies* (London: Routledge, 1995)
- Guy, John, 'The Privy Council: Revolution or Evolution', in *Revolution Reassessed*, ed. by David Starkey and Christopher Coleman (Oxford, Clarendon Press, 1986), pp.59-86
- *Tudor England* (Oxford, 1988)
- Hackett, Jeremiah, 'Necessity, Fate and a Science of Experience in Albertus Magnus, Thomas Aquinas and Roger Bacon', in *Sewanee Medieval Studies 6*, ed. by Susan Ridyard and Robert Benson (1995), pp.113-23
- Hackmann, W., 'Nicolaus Kratzer: the King's astronomer and Renaissance instrument-maker', in *Henry VIII: a European Court in England*, ed. by David Starkey (London: British Library, 1991), pp.70-3
- Hale, J. R., *Renaissance Fortification: Art or Engineering* (London: Thames and Hudson, 1977)

- 'Tudor Fortifications: The Defense of the Realm, 1485- 1558', in *The History of the King's Works Vol.IV 1485- 1660 Part II*, ed. by H.M. Colvin (HMSO: London, 1982), pp.367-401
- 'The Early Development of the Bastion; an Italian Chronology c.1450-1534', in *Europe in the Late Middle Ages*, ed. by J.R. Hale (London: Faber, 1985), pp.466-494
- Harley, Brian and David Woodward, 'Preface', in *The History of Cartography: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean, Vol 1*, ed. by J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987), pp. xv-xxi
- Harley, Brian, 'The Map and the Development of the History of Cartography' in *The History of Cartography: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean, Vol 1*, ed. by J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987), pp.1-42
- 'Maps, Knowledge, and Power', in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments*, ed. by Denis Cosgrove and Stephen Daniels (Cambridge, Cambridge University Press, 1988), pp.277-312; reprinted in *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), pp.51-81
- 'Silences and Secrecy: The Hidden Agenda of Cartography in Early Modern Europe', *Imago Mundi*, 40 (1988), pp.57-76; reprinted in *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), pp.83-107
- 'Deconstructing the Map', in *Cartographica* 26, no. 2 (1989), pp.1-20; reprinted in *The New Nature of Maps: Essays in the History of Cartography*, ed. by Paul Laxton (Baltimore, Md.: Johns Hopkins University Press, 2001), pp.149-68
- Harrison, Stuart, and Paul Barker, 'Byland Abbey, North Yorkshire: The West Front and Rose Window Re-constructed', *Journal of the British Archaeological Association*, Vol. 140, No.1 (1987), pp.134-151
- Harriss, G.L. and Penry Williams, 'A Revolution in Tudor History?', *Past & Present*, 31 (1965), pp.87-96
- Harvey, David, *The Condition of Postmodernity* (Oxford: Blackwell, 1989)
- Harvey, J.H., 'The Medieval Office of Works', *Journal of the British Archaeological Association*, 3rd Ser. VI (1941), pp.20-86
- 'The Education of the Medieval Architect', *Journal of the R.I.B.A.*, 3rd Ser. LII (1945), pp.232-233
- "Early Tudor Draughtsmen," in *The Connoisseur Coronation Year Book*, ed. by L. Ramsey (London, 1953), pp.97-102
- *The Gothic World 1100-1600: a Survey of Art and Architecture* (London: Batsford, 1958)
- *The Medieval Architect* (London: Wayland, 1972)
- *The Perpendicular Style 1330-1485* (London: Batsford, 1978)
- *English Mediaeval Architects: a Biographical Dictionary down to 1550* (Gloucester: Sutton, 1984)
- 'The Tracing Floor of York Minster', in *The Engineering of Medieval Cathedrals*, ed. by L. T. Courtenay (Aldershot: Ashgate Publishing, 1997), pp.81-86
- Harvey, P. D. A., *The History of Topographical Maps, Symbols, Pictures and Surveys* (London: Thames and Hudson, 1980)
- 'The Portsmouth Map of 1545 and the Introduction of Scale Maps into England', in *Hampshire Studies*, ed. by John Webb, Nigel Yates and Sarah E. Peacock (Portsmouth: Portsmouth City Records Office, 1981), pp.33-49

- *Maps in Tudor England* (London: British Library, 1993)
- Hayes, D.W., 'Backbiter and the Rhetoric of Destruction', *Comparative Drama*, 34:1 (2000), p. 377-94
- Henry, A., 'Dramatic Functions of Rhyme and Stanza Patterns in *The Castle of Perseverance*', in *Individuality and Achievement in Middle English Poetry*, ed. by Oliver Pickering (Cambridge: D.S. Brewer, 1996), pp.147-83
- Heslop, D.A., 'Excavations within the Church at the Augustinian Priory of Gisborough Cleveland', *Yorkshire Archaeological Journal*, 67 (1995), pp.51-125
- Hessler, John, *The Naming of America; Martin Waldseemüller's 1507 Map and the Cosmographiae Introductio* (London: GILES, 2007)
- Heyman, Jacques, *The Stone Skeleton: Structural Engineering of Masonry Architecture* (Cambridge: Cambridge University Press, 1995)
- Hislop, Malcom, *Medieval Masons* (Princes Risborough: Shire, 2000)
- The Historians Guide to Ordnance Survey Maps*, ed. by J.B. Harley and C.W. Philips (London: National Council of Social Service for The Standing Conference for Local History, 1964)
- Hogrefe, Pearl, *The Thomas More Circle: A Program of Ideas and their Influence on Secular Drama* (Urbana: University of Illinois Press, 1959)
- Holton, A. B., 'Medieval Practices of Design: the Tracing Houses of York Minster and Wells Cathedral', (Unpublished MA thesis, University of York, 2005)
- Holton, A. B., 'The Working Space of the Medieval Master Mason: the Tracing Houses of York Minster and Wells Cathedral', in *Proceedings of the Second International Congress on Construction History Volume II*, (2006), p1579-1597; reproduced: <<http://www.arct.cam.ac.uk/Downloads/ichs/vol-2-1579-1598-holton.pdf>> [accessed 27th June 2013]
- Humphrey, Chris, *The Politics of Carnival: Festive Misrule in Medieval England* (Manchester: Manchester University Press, 2001)
- Hutson, Lorna, 'Fortunate travelers: Reading for the Plot', *Representations*, No. 41 (Winter, 1993), pp.83-103
- Ives, Eric, 'Henry VIII: the Political Perspective', in *The Reign of Henry VIII: Politics, Policy and Piety*, ed. by Diarmaid MacCulloch (Basingstoke, 1995), pp.13-34
- Jacob, Christian, *The Sovereign Map: Theoretical Approaches in Cartography Throughout History*, (Chicago : University of Chicago Press, 2006)
- Jameson, Frederick, 'Criticism in History', in *The Ideologies of Theory: Essays 1971-1986 vol.1*. (Minneapolis: University of Minneapolis Press, 1988), pp.119-56
- 'Of Islands and Trenches', in *The Ideologies of Theory: Essays 1971-1986 vol.2*. (Minneapolis: University of Minneapolis Press, 1988), pp.75-101
- *The Political Unconscious: Narrative as a Socially Symbolic Act* (New York: Cornell University Press, 1981)
- Jardine, Lisa, *Erasmus, Man of Letters: The Construction of Charisma in Print* (Princeton: Princeton University Press, 1993)
- Johnson, Hildegard Binder, *Carta Marina: World Geography in Strasburg, 1525* (Westport, Conn.: Greenwood Press, 1974)
- Jurgen-Diller, Hans, *The Medieval Mystery play, a Study in Speech and Form*, trans. By Frances Wessels (Cambridge: Cambridge University Press, 1992)
- Keen, Lawrence and Thomas Cocke, *Medieval Art and Architecture at Salisbury Cathedral* (Tring: British Archeological Association Conference Transactions 17, 1996)

- Kelley, James, 'The Oldest Portolan Chart in the New World', *Terrae Incognitae: Annals of the Society for the History of Discoveries*, 9 (1977), pp.22-48
- 'Non-Mediterranean Influences that Shaped the Atlantic in the Early Portolan Charts', *Imago Mundi*, 31 (1979), pp.18-35
- Kelly, Henry, *The Devil at Baptism: Ritual Theology and Drama* (New York, Cornell University Press, 1985)
- Kidson, Paul, *Systems of Measurement and Proportion* (Unpublished Phd. Thesis, Courtauld Institute, 1956)
- *A History of English Architecture* (Harmondsworth: Penguin, 1965)
- King, Pamela, 'Spatial Semantics and the Medieval Theatre', in *The Theatrical Space*, ed. by Stephanie Arnold and James Redmond (Cambridge: Cambridge University Press, 1987), pp.45- 58
- Kipling, Gordon, *The Recyt of Ladie Kateryne* (Oxford: Oxford University Press, 1990)
- Kirby, Kathleen, *Indifferent Boundaries: Spatial Concepts of Human Subjectivity* (New York: The Guildford Press, 1996)
- Kitchin, Rob, and Scott Freundschuh, *Cognitive Mapping* (London: Routledge, 2000)
- Knoop, Douglas and G.P. Jones, 'Latlaying the Groundwork', *Miscellanea Latomorum*, New Series, XXII (1937), pp.29-31
- Knoop, Douglas, *The Medieval Mason: an Economic History of English Stone Building in the Later Middle Ages and Early Modern Times* (Manchester: Manchester University Press, 1933)
- Kupfer, Maria, 'Medieval World Maps: Embedded Images, Interpretive frames', *Word and Image*, 10/3 (July- September, 1994), pp.262-288
- Lancashire, I. ed., *Dramatic texts and Records of Britain: A Chronological Topography to 1558* (Cambridge: Cambridge University Press, 1984)
- Latour, Bruno, 'Visualization and Cognition: Thinking with Eyes and Hands', *Knowledge and Society*, 6 (1986), pp.1-40
- *Science in Action: How to Follow Scientists and Engineers Through Society* (Milton Keynes: Open University Press, 1987)
- Lefebvre, Henri, *The Production of Space*, trans. by Donald Nickelson-Smith (Oxford: Blackwell, 1991)
- Lefevre, Wolfgang, 'The Emergence of Combined Orthographic Projections', in *Picturing Machines 1400-1700*, ed. by Wolfgang Lefevre (Cambridge, MA: MIT Press, 2004), pp.209-244
- Lemay, Richard, *Abu Ma'shar and Latin Aristotelianism in the 12th century: The Recovery of Aristotle's Natural Philosophy through Arabic Astrology* (Beirut: American university of Beirut, 1962)
- 'The True Place of Astrology in Medieval Science and Philosophy: Towards a Definition', in *Astrology, Science and Society: Historical Essays*, ed. by Patrick Curry (Woodbridge, Suffolk: Boydell Press, 1987), pp.57-73
- Lewer, David, and Robert Dark, *The Temple Church in London* (London: Historical Publications, 1997)
- Lindley, Philip, "'The Singular Mediations and Prayers of All the Holy Company of Heaven" Sculptural Functions and Forms in Henry VII's Chapel', in *Westminster Abbey: The Lady Chapel of Henry VII*, ed. Tim Tatton-Brown and Richard Mortimer (Woodbridge: Boydell Press, 2003), pp.259-93

- Lindley, Philip, 'The Sculptural Programme of Bishop Fox's Chantry Chapel', in *Gothic to the Renaissance: Essays on Sculpture in England* (Stamford: Paul Watkins, 1995), pp.207-212
- Loades, David, *Power in Tudor England* (New York: St Martin's Press, 1996)
- *Henry VIII: Court, Church and Conflict* (Kew: National Archives, 2007)
- MacCulloch, Diarmaid, 'Introduction', in *The Reign of Henry VIII: Politics, Policy and Piety*, ed. by Diarmaid MacCulloch (New York: St Martin's Press, 1996), pp.1-13
- Maddison, John, *Ely Cathedral: Meaning and Design* (Ely: Ely Cathedral Publications, 2000)
- Marenbon, John, *Later Medieval Philosophy (1150-1350): An Introduction* (London: Routledge, 1991)
- Mark, Richard, *Architectural Technology up to the Scientific Revolution; the Art and Structure of Large Scale Buildings* (Cambridge, Mass.: MIT Press, 1993)
- Marks, Richard, and Paul Williamson, *Gothic: Art for England 1400-1547* (London: V&A Publications, 2003)
- McCarthy, Jeanne, 'The Emergence of Henrician Drama 'In the kynges absens'', *English Literary Renaissance*, 39: 2 (2009), pp.231-66
- McKinnell, John, 'Staging the Digby Mary Magdalene', *Medieval English Theatre*, 6/2 (December, 1984), pp.126-152
- McLean, Matthew, *The Cosmographia of Sebastian Münster: Describing the World in the Reformation* (Aldershot, Ashgate: 2007)
- Mears, Natalie, 'Court, Courtiers and Culture in Tudor England', *Historical Journal*, 46:3 (September, 2003), pp.703-22
- Merriman, Marcus, 'Italian Military Engineers in England in the 1540's', in *English Map Making 1500-1565: Historical essays*, ed. by S. Tyacke (London: British Library, 1983), pp.57-67
- Michelet, Jules, *Satanism and Witchcraft: A Study in Medieval Superstition*, trans. By Alfred Allinson (New York: Citadel Press, 1939)
- Milanesi, Marcia, 'Geography and Cosmography in Italy from the XV to the XVII century', in *Memorie della societa Astronomica Italiana*, 65 (1994), pp.443-68
- Mimis, Alastair, *Medieval Theories of Authorship: Scholastic Literary Attitudes in the Late Middle Ages* (London: Scholar Press, 1988)
- Murdoch, John, 'The Analytic Character of Late Medieval Learning: Natural Philosophy without Nature', in *Approaches to Nature in the Middle Ages*, ed. by Lawrence Roberts (Binghampton, NY.: Center for Medieval and Early Renaissance Studies, 1982), pp.171-213
- Neagley, Linda, 'The Late Gothic Plan Design of St Maclou in Rouen', *The Art Bulletin*, Vol. 74, No. 3 (September, 1992), pp.395-422
- *Disciplined Exuberance; The Church of St Maclou and late Gothic Architecture in Rouen* (Pensylvania: Pensylvania University Press, 1998)
- North, J. D., 'Nicolaus Kratzer - the King's Astronomer', in *Science and History: Studies in Honour of Edward Rosen*, ed. by E. Hilfstein et al. (Wrocław: Ossolineum, 1978), pp.205-34.
- 'Medieval Concepts of Celestial Influence', in *Astrology, Science, and Society : Historical Essays*, ed. Patrick Curry (Suffolk: Boydell Press, 1987), pp.5-17
- Nugent, Elizabeth, 'Sources of Rastell's Four Elements', *Publications of the Modern Language Association*, 57:1 (1942), pp.74-88

- Nuti, Lucia, 'The Perspective Plan in the Sixteenth Century: the Invention of a Representational Language', *Art Bulletin*, 76 (1994), pp.105-128
- Orlin, Lena, *Locating Privacy in Tudor London* (Oxford: Oxford University Press, 2007)
- Ozawa, H, 'The Structural Innovations of the More circle dramatists', *Shakespeare Studies, Shakespeare Society of Japan*, 19 (1984), pp.1-24
- Pacey, Arnold, *Meaning in Technology* (Cambridge, Mass.: MIT Press, 1999)
- *Medieval Architectural Drawing; English Craftsmen's Methods and their Later Persistence c.1200-2700* (Stroud: Tempus, 2007)
- Panofsky, Erwin, 'Iconography and Iconology: an Introduction to the Study of Renaissance art', in *Meaning in the Visual Arts* (Harmondsworth: Penguin, 1970), pp.51-81
- Parks, G.B., 'Rastell and Waldseemullers map', *Publications of the Modern Language Association*, 58:2 (1943), pp.572-4
- Parr, J., 'More Sources of Rastell's *Interlude of the Four Elements*', *Publications of the Modern Language Association*, 60:1 (1945), pp.48-58
- 'Rastell's Geographical Knowledge of America', *Philological Quarterly*, 27:3 (1948), pp.229-40
- Parry, David, 'A Margin of Error, the Problems of Marginalia in *The Castle of Perseverance*', in *Editing Early English Drama: Special Problems and New Directions*, ed. by A.F. Johnston (New York: AMS Press, 1987), pp.33-64
- Patterson, Lee, 'On the Margin: Postmodernism, Ironic history, and Medieval studies', *Speculum*, 65 (1990), pp.87-108
- Percy, Walker, 'Symbol, Consciousness and Intersubjectivity', *Journal of Philosophy*, 55 (1958), pp.631-41
- Pevsner, Nikolaus, 'The Term Architect in the Middle Ages', *Speculum*, XVII (1942), pp.549-562
- *The Leaves of Southwell* (Harmondsworth: Penguin, 1945)
- Pietropaolo, Domenico, "Spectacular Literacy and 'The Topology of Significance'", in *Petrarch's Triumphs: Allegory and Spectacle*, ed. by Konrad Eisenbichler and Amilcare Iannucci (Ottowa: Dovehouse editions, 1990), pp.359-368
- Pinto, John, 'Origins and Development of the Ichnographic City Plan', *Journal of the Society of Architectural Historians*, 35 (1976), pp.35-50
- Ragep, J., 'Freeing Astronomy from Philosophy: An Aspect of Islamic Influence on Science', *Osiris*, 16 (2010), pp.49-71
- Reed, A.W., *Early Tudor Drama: Medwall, the Rastells, Heywood, and the More circle* (London: Methuen, 1926)
- Roberts, R.J., 'John Rastell's Inventory of 1538', *The Library*, 6th Series 1 (1979), pp.34-42
- Rodwell, Kirsty, and Robert Bell, *Acton Court, The Evolution of an Early Tudor Courtier's House* (London: English Heritage, 2004)
- Rorem, Paul, *Hugh of St Victor* (Oxford: Oxford University Press, 2007)
- Rudolf, Conrad, *First, I Find the Centre Point: Reading the Text of Hugh of Saint Victor's The Mystic Ark* (Philadelphia: American Philosophical Society, 2004)
- Rundstrom, Robert, 'Mapping, Postmodernism, Indigenous People and the Changing Direction of North American Cartography', *Cartographica*, Vol. 28, No. 2, Summer (1991), pp.1-12
- Rycroft, Eleanor, 'The Play of the Weather in Performance at Hampton Court', *Medieval English Theatre*, Vol. 31 (2009), p. 13-27

- Salzman, L.F., *Building in England Down to 1540; A Documentary History* (Oxford: Clarendon, 1952)
- Sampson, Jerry, *Wells Cathedral West Front: Construction, Sculpture and Conservation* (Stroud: Sutton, 1998)
- Saunders, Andrew, *Fortress Britain: Artillery Fortification in the British Isles* (Liphook: Beaufort Publishing, 1989)
- Scafi, Alessandro, *Mapping Paradise: a History of Heaven on Earth* (London: British Library, 2006)
- Scarlsbrick, J., *Henry VIII* (New Haven: Yale University Press, 1997)
- Schechner, Richard, *Performance Theory* (London: Routledge, 1999)
- Scheller, R.W., *Exemplum: Model Book Drawings and the Practice of Artistic Transmission c.900- 1475* (Amsterdam: Amsterdam University Press, 1995)
- Scherb, Victor, 'Worldly and Sacred Messengers in the Digby MM', *English Studies*, 73/1 (February 1992), pp.1-9
- Schmitt, Nathalie, 'Was there a Medieval Theatre in the Round? A Re-examination of the Evidence', in *Medieval English Drama Essays; Critical and Contextual*, ed. by Jerome Taylor and Alan Nelson (Chicago: University of Chicago Press, 1972), pp.292-315
- Schnell, E.T., *Strangers and Pilgrims; From the Castle of Perseverance to King Lear* (Chicago: University of Chicago Press, 1983)
- Sciences of the Earth; An Encyclopedia of Events, People, and Phenomena*, ed. by Gregory Good (London: Garland Pub, 1998)
- Shah, Priti, and Akira Miyake, *The Cambridge Handbook of Visuospatial thinking*, (Cambridge: Cambridge University Press, 2005)
- Sharpe, James, *Instruments of Darkness: Witchcraft in England* (London: Hamish Hamilton, 1996)
- Shelby, Lon, and R. Mark, 'Late Gothic Structural Design', *Architectura*, 9 (1979), pp.113-31
- Shelby, Lon, 'Master Mason's Tools: The Level and the Plumb Rule', *Technology and Culture*, Vol. 2, No. 2 (Spring, 1961), pp.127-130
- 'The Role of the Master Mason in Mediaeval English Building', *Speculum*, Vol. 39, No. 3 (July, 1964), pp.387-403
- 'Master Masons's Tools II: The Compass and the Square', *Technology and Culture*, Vol. 6, No. 2 (Spring, 1965), pp.236-248
- *John Rogers, Tudor Military Engineer* (Oxford: Clarendon, 1967)
- 'Setting out the Keystones of Pointed Arches: A Note on Medieval Baugeometrie', *Technology and Culture*, Vol. 10, No. 4 (October, 1969), pp.537-548
- 'The Education of the Medieval Mason', *Medieval Studies*, XXXII (1970), pp.1-26
- 'Medieval Masons' Templates', *Journal of the Society of Architectural Historians*, Vol. 30, No. 2 (May, 1971), pp.140-154
- 'The Geometrical Knowledge of the Medieval Master Masons'', *Speculum*, Vol. 47, No. 3 (July, 1972), pp.395-421
- Sherlock, David, *Medieval Drawings and Writings in Ashwell Church, Hertfordshire* (Ashwell: Ashwell Parish Church, 1978)
- Simon, Thurley, 'The Banqueting and Disguising Houses of 1527', in *Henry VIII; a European Court in England*, ed. by David Starkey (London: Collins & Brown in association with the National Maritime Museum, 1991)

- Skelton, R.A., and John Summerson, *A Description of Maps and Architectural Drawings in the Collection made by William Cecil, First Baron Burghley, now at Hatfield House* (Oxford: Roxburghe Club, 1971)
- Skelton, R.A., and P.D.A Harvey, *Local Maps and Plans from Medieval England* (Oxford: Clarendon Press, 1986)
- Skelton, R.A., 'The Military Surveyors Contribution to British Cartography in the 16th Century', *Imago Mundi*, XXIV (1970), pp.77-83
- *Maps: A Historical Survey of Their Study and Collecting* (Chicago: University of Chicago Press, 1972)
- Skinner, Quentin, 'The Eltonian Legacy: Sir Geoffrey Elton and the Practice of History', *Transactions of the Royal Historical Society*, 6th Series, Volume 7 (1997), pp.301-316
- Smith, Angela, 'The Chantry Chapel of Bishop Fox', *Winchester Cathedral Record*, 57 (1988), p.27-32
- Smith, D.K., *The Cartographic Imagination in Early Modern England: Re-writing the World in Marlowe, Spenser, Raleigh and Marvell* (Aldershot: Ashgate, 2008)
- Sommerville, John, *The Secularisation of Early Modern England* (Oxford: Oxford University Press, 1992)
- Southern, Richard, *The Medieval Theatre in the Round: A Study of the Castle of Perseverance and Related Matters* (London: Faber and Faber, 1957)
- 'The Contribution of the Interludes to Elizabethan Staging', in *Essays on Shakespeare and Elizabethan Drama*, ed. by Richard Hosley (London: Routledge & Kegan Paul, 1963), pp.3-14
- *The Staging of Plays before Shakespeare* (London: Faber and Faber, 1973)
- Speigel, Gabrielle, *The Past as Text: The Theory and Practice of Medieval Historiography*, (Baltimore: John Hopkins University Press, 1997)
- Starkey, David, 'The Age of the Household: Politics, Society and the Arts, c. 1350-c. 1550', in *The Later Middle Ages*, ed. Stephen Medcalf (New York: Holmes and Meier, 1981), pp.225-90
- 'Which Age of Reform', in *Revolution Reassessed: Revisions in the History of Tudor Government and Administration*, ed. Christopher Coleman and David Starkey (Oxford: Oxford University Press, 1986), pp.13-27
- 'Court and Government', in *Revolution Reassessed: Revisions in the History of Tudor Government and Administration*, ed. Christopher Coleman and David Starkey (Oxford: Oxford University Press, 1986), pp.29-58
- 'Intimacy and Innovation: The Rise of the Privy Chamber, 1485-1547', in *The English Court: From the Wars of the Roses to the Civil War*, ed. by David Starkey (London: Longman, 1987), pp.71-118
- 'Introduction: Court History in Perspective', in *The English Court: from the Wars of the Roses to the Civil War*, ed. by David Starkey (London: Longman, 1987), pp.1-24
- 'A Reply: Tudor Government: The Facts?', *Historical Journal*, 31:4 (December, 1988), pp.921-31
- *Henry VIII: Virtuous Prince* (London: Harper Press, 2008)
- Stevens, Martin, 'From Mappa Mundi to Theatrum Mundi: The World as Stage in Early Modern English Drama', in *From Page to Performance: Essays in Early English Drama*, ed. by John Alford (East Lansing: Michigan State University Press, 1995), pp.25-49
- Stock, Brian, 'The Middle Ages as Subject and Object', *New Literary History*, 5 (1974), pp.527-547

- Stone, Lawrence, *The Pelican History of Art: Sculpture in Britain: The Middle Ages* (Harmondsworth: Penguin, 1955)
- Streitberger, W.R., 'The Development of Henry VIII's Revels Establishment', *Medieval English Theatre*, 7: 2 (1985), pp.83-100
- 'William Cornish and The Players of the Chapel', *Medieval English Theatre*, 8.1 (1986), pp.3-20
- *The Medieval Theatre* (Cambridge: Cambridge University Press, 1987)
- *Court Revels 1485-1559* (Toronto: University of Toronto Press, 1994)
- *The Early English Stage* (London: Routledge, 2002)
- Strohm, Paul, *Theory and the Pre-modern Text* (Minneapolis: University of Minneapolis Press, 2000)
- Summers, Norman, *The Chapter House, Southwell Minster* (Derby: English Life Publications, 1984)
- Swanson, Heather, *Exeter Cathedral: a Celebration* (Crediton: Dean and Chapter of Exeter, 1991)
- Swanson, Heather, *Medieval Artisans; An Urban Class in Late Medieval England* (Oxford: Blackwell, 1989)
- Sylla, Edith, 'Autonomous and Handmaiden Science: St Thomas Aquinas and William of Ockham on the Physics of the Eucharist', in *The Cultural Context of Medieval Learning, Proceedings of the First International Colloquium on Philosophy, Science, and Theology in the Middle Ages —September 1973*, ed. by Edith Sylla and John Murdoch (Dordrecht: Reidel, 1975), pp.361-372
- 'Creation and Nature', in *The Cambridge Companion to Medieval Philosophy*, ed. by Arthur Stephen McGrade (Cambridge: Cambridge University Press, 2003), pp.171-195
- Taylor, E.G.R., *Tudor Geography* (London: Methuen, 1930)
- Thrift, Nigel, and Mike Crang, *Thinking Space* (London: Routledge, 2000)
- Thrift, Nigel, and John May, *Timespace; Geographies of Temporality* (London: Routledge, 2001)
- Thurley, Simon, *The Royal Palaces of Tudor England: Architecture and Court life, 1460-1547* (New Haven, Conn.: Yale University Press, 1993)
- *Whitehall Palace: An Architectural History of the Royal Apartments, 1240-1698* (New Haven: Yale University Press, 1999)
- *Hampton Court: a Social and Architectural History* (New Haven: Yale University Press, 2003)
- Toker, Franklin, 'Gothic Architecture by Remote Control: An Illustrated Building Contract of 1340', *The Art Bulletin*, Vol. 67, No. 1 (March, 1985), pp.67-95
- Tydeman, William, *English Medieval Theatre* (London: Routledge, 1986)
- Vallega, Alejandro, *Heidegger and the Issue of Space: Thinking on Exilic Grounds* (Pennsylvania: University of Pennsylvania Press, 2003)
- Vickers, Brian, 'On the Function of Analogy in the Occult', in *Hermeticism and the Renaissance: Intellectual History and the Occult in Early Modern Europe*, ed. by Ingrid Merkel and Allen G. Debus (Washington, D.C.: Folger Shakespeare Library, 1998), pp.265-292
- Victor, Stephen, *Practical Geometry in the High Middle Ages* (Unpublished Phd thesis, Harvard, 1973)
- Walker, Greg, *Plays of Persuasion: Drama and Politics at the Court of Henry VIII* (Cambridge: Cambridge University Press, 1991)

- Wallace, David, *Premodern Places: Calais to Surinam, Chaucer to Aphra Behn* (Oxford: Blackwell, 2004)
- Walsham, Alexandra, *The Reformation of the Landscape: Religion, Identity, and Memory in Early Modern Britain and Ireland* (Oxford: Oxford University Press, 2011)
- Weimann, Robert, *Shakespeare and the Popular Tradition: Studies in the Social Dimension of Dramatic Form and Function* (Baltimore: J. Hopkins University Press, 1978)
- *Author's Pen and Actor's Voice: Playing and Writing in Shakespeare's Theatre* (Cambridge: Cambridge University Press, 2000)
- West, William, 'The Idea of a Theatre: Humanist Ideology and the Imaginary Stage in Early Modern Europe', in *Renaissance Drama*, New Series, 28 (Evanston: Northwestern University Press, 1999), pp.245-87
- Westfall, Suzanne, *Patrons and Performance; Early Tudor Household Revels* (Oxford: Oxford University Press, 1990)
- White, Hayden, *The Content of the Form: Narrative Discourse and Historical Representation* (Baltimore: John Hopkins University Press, 1986)
- White, Paul, *Theatre and Reformation: Protestantism, Patronage and Playing in Tudor England* (Cambridge: Cambridge University Press, 1992)
- Wightman, William, *Science and the Renaissance* (Aberdeen: Oliver & Boyd, 1964)
- Williamson, Paul, *Gothic Sculpture 1140- 1300* (New Haven, Conn.: Yale University Press, 1995)
- Willoughby, Edwin, 'Printer's Mark of John Rastell', *Library Quarterly*, 6 (1936), pp.420-21
- Wilson, W.D., 'The Work of the Heckington Lodge of Masons, 1315-1345', *Lincolnshire History and Archaeology*, 15 (1980), pp.21-28
- Wooding, Lucy, *Henry VIII* (London: Routledge, 2009)
- Woodman, Francis, 'The Waterworks Drawings of the Eadwine Psalter', in *The Eadwine Psalter: Text, Image, and Monastic Culture in Twelfth-century Canterbury*, ed. by Margaret Gibson, T. Heslop and Richard Pfaff (University Park, PA.: Pennsylvania State University Press, 1992), pp.168-177
- Woodward, David, 'Maps and the Rationalization of Geographic Space', in *Circa 1492: Art in the Age of Exploration* (New Haven, Conn.: Yale University Press, 1992)
- Woodward, David, 'Reality, Symbolism, Time and Space, in Medieval World Maps', *Annals of the Association of American Geographers*, 75 (1985), pp.510-552
- Woodward, David, 'Roger Bacon's Terrestrial Coordinate System', in *Annals of the Association of American Geographers*, 80:1 (1990), pp.109-122
- Woolf, Rosemary, *The English Religious Lyric in the Middle Ages* (Oxford: Oxford University Press, 1968)
- Wright, M.R., *Cosmology in Antiquity* (London: Routledge, 1995)
- Wu, Nancy, (ed.) *Ad Quadratum; The Practical Application of Geometry in Medieval Architecture* (Aldershot: Ashgate, 2002)

